104

[H.N.S.C. No. 104–54]

TACTICAL AIRCRAFT PROGRAMS

Y 4.SE 2/1 A:995-96/54

Tactical Aircraft Programs, (H.N.S....

BEFORE THE

MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE

JOINT WITH

MILITARY PROCUREMENT SUBCOMMITTEE

OF THE

COMMITTEE ON NATIONAL SECURITY
HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

SECOND SESSION

HEARING HELD
JUNE 27, 1996

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TACTICAL AIRCRAFT PROGRAMS

HOUSE OF REPRESENTATIVES, COMMITTEE ON NATIONAL SECURITY, MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE, JOINT WITH MILITARY PROCUREMENT SUBCOMMITTEE,

Washington, DC, June 27, 1996.

The subcommittees met, pursuant to notice, at 1:12 p.m., in room 2118, Rayburn House Office Building, Hon. Curt Weldon (chairman of the Subcommittee on Research and Development) presiding.

OPENING STATEMENT OF HON. CURT WELDON, A REPRESENTATIVE FROM PENNSYLVANIA, CHAIRMAN, RESEARCH AND DEVELOPMENT SUBCOMMITTEE

Mr. WELDON. The subcommittees of Research and Development and Procurement will come to order. I welcome you all to the hearing room today, and we start with sadness following the recent tragic loss of our service personnel in Saudi Arabia and extend our deepest sympathies to families and the leaders of the Air Force for this terribly tragic incident. We are also saddened today with the services being conducted at this time for our distinguished colleague and friend Bill Emerson, and for that reason, several of our colleagues will not be able to be in attendance who would have liked to have been here for this hearing.

This afternoon, the Military Research and Development and Military Procurement subcommittees meet jointly and welcome our witnesses from the Department of Defense, the General Accounting Office and Congressional Budget Office to provide testimony on the Department's tactical aircraft programs. While there are many weapons systems, fixed-wing aircraft and helicopters that contribute to the Nation's overall tactical air power capability, our focus today is primarily on the F–22, the F/A–18E/F, and the joint strike fighter.

As was so vividly demonstrated during Desert Storm, an effective tactical air power component of the Nation's military, to include associated precision-guide munitions capabilities is fundamental to our national military strategy. Fortunately for our military personnel and the Nation, the history of tactical air power operational successes is far more meritorious than its often troubled programmatic and budgetary past. Too often in the past, billions of dollars have been spent developing aircraft we didn't procure or on aircraft we procured in quantities too little to justify the development costs, to include the A–6F, the F–14D, the A–12, the ATA–AX, and the Navy advanced tactical fighter. The A–12 has yet to deal its final blow to the U.S. Treasury.

We couldn't afford the nonproductive expenditures of the past and if repeated in the projected budgetary environment, such expenditures would exact severe penalties on our future military capability. Our objective is to ensure that our troubled tac air past doesn't haunt our tac air future. There are a number of reasons for us to be concerned.

First, the Department of Defense faces a daunting challenge to fund not just tac air but its entire defense program, as our chairman has pointed out so many times. The current funding shortfall to fund the national military strategy over the future years defense plan has been estimated to be $100 billion to $150 billion. In the projected budget environment, I do not believe there is anyone who seriously believes that it is possible to recapitalize the force structure for ships, Army combat vehicles, aircraft, and other requirements the Department's leadership and military say they need.

The Chairman of the Joint Chiefs of Staff and the chiefs of the services indicate that the annual shortfall just for procurement is $20 billion. Further, the more time passes, the more elusive the hope for infrastructure savings due to base closings, acquisition reform and privatization of some DOD activities become. The GAO indicates that infrastructure costs alone are actually likely to increase by $26 billion between 1997 and 2001. Additional major budget shortfalls will be experienced if the optimistic inflation rates that have been assumed are not realized.

Second, several distinguished groups and individuals who have spent a great deal of time examining overall military requirements and the specific requirements of tactical air power have expressed their concerns. In May of last year, the report of the Roles and Missions Commission indicated that the Department of Defense may have greater quantities of strike aircraft and other deep attack weapons systems than it needs. Further, the Commission observed that this results from, and I quote:

> A set of institutional practices that allow the services to develop and field new weapons without a rigorous, DOD-wide assessment of the need for these weapons and how they will be integrated with the other elements planned for our arsenal.

Today, Mr. Davis from the General Accounting Office will provide similar testimony on this issue. Last October, the Chairman of the Joint Chiefs of Staff, in a memorandum to the Secretary of Defense noted, and I quote:

> There are numerous recapitalization issues which we must face in the very near future. For instance, tactical aircraft procurement plans call for much greater than expected resources in the out years, causing slippages in planned IOC's every year.

In November of last year, the Defense Science Board cited the importance of strike and attack platforms like the F/A–18E–F, the joint strike fighter, the multiple launch rocket system, army tactical missile system, bomber upgrades and cruise missile launching platforms, but it questioned, and I quote: "Do we need them all?"

Third, the very basis of the tactical air power decisions associated with the October 1993 Bottom-Up Review have been called into question. At the time of the so-called BUR, the tactical aircraft program consisted of four aircraft programs: the F–22 for the Air Force, the F/A–18E/F for the Navy and Marine Corps, the A/F–X for the Navy and Air Force, and the multirole fighter for the Air Force. The Bottom-Up Review resulted in the Department's can-

cellation of the A/F–X and the multirole fighter and the initiation of the joint advanced strike technology or JAST program, which has now become the joint strike fighter program.

Very important: in October of 1993, the Department cited the unaffordability of the $340 billion for the four-aircraft program. Yet, with the sudden evolution of JAST to JSF, the Congressional Budget Office tells us the new three aircraft, F–22, F–18, JSF program proposed by the Department is estimated to cost $356 billion, $14 billion more than the program canceled as a result of the Bottom-Up Review and along with the $82 billion that has been taken out of the 1993–99 Defense budget. Further, estimates to fund the tac air program proposed would require between $14.5 billion and $17 billion per year in 1977 dollars, as we compare that to this year's $2.7 billion request for tactical aviation programs.

Making precise estimates of programs of such magnitude is clearly a difficult undertaking. However, the indicated shortfalls highlighted by the estimates, taken in context with the Chairman of the Joint Chiefs' statement as well as those of the Defense Science Board and the Roles and Missions Commission should give us all great cause for concern. Further, the Department's very conduct of its requirements and acquisition processes raises serious concerns. While the military services and the Office of the Secretary may be satisfied with these processes, the recent way they have been implemented could be perceived as seriously violating the spirit and intent of legislation related to requirements and acquisition processes.

All three tac air programs have varying degrees of problems. After repeated assurances by the Air Force over the past few years that it was confident of the affordability of the F–22, the Air Force recently notified the Congress that it would have to delete the two-seat F–22B trainer model from its program because of budgetary concerns. While the Air Force puts the best face on it, I don't view it as a trivial modification to the program. Somehow, as a taxpayer, handing the keys of a $75 million F–22 to a 22-year-old to go off and fly makes me a bit nervous. I know how difficult it is to sit in the same car and teach my son to drive. It might be safer to sit in a chase car and instruct him over a cell phone, but I feel a whole lot better about his safety and my car when I'm sitting beside him.

The F/A–18E/F requirement for 1,000 aircraft for the Navy and the Marine Corps was validated by the Joint Requirements Oversight Council. The documentation of the Marine Corps requirement varies between approximately 250 and 400 aircraft. The Secretary of Defense's annual report to Congress and the Department's selected acquisition reports to the Congress for the last 4 years indicate that the F/A–18E/F is a joint Navy–Marine Corps program. Yet, we understand through the media that the Marines have no plans to participate in the F/A–18E/F program, and we are not aware of any notification to the Congress that corrects the Secretary of Defense report or other reports from the Department. While this has no immediate impact to F/A–18E/F programmatics, it has major long-term budget implications.

The joint advanced strike technology program, now known as the joint strike fighter program, evolved over 15 months from a technology demonstration program to what was described until 1

month ago as a 3,000 aircraft, $300 billion nonacquisition program. The projected R&D costs alone approached $20 billion in today's dollars. Yet, none of the alternative analyses appear to have been done nor normal, legislatively required congressional reports have been submitted.

This Congress supports acquisition reform aggressively, but this kind of program management totally violates the spirit and intent of the established procedures for initiating a program and providing the Congress the information it needs to conduct its constitutional responsibilities. With the recent agreement by the Department to properly classify the program as a major defense acquisition program, we are told that we should not worry, that even though the normal processes have not been followed, the program has close oversight within the Department.

What concerns me personally is that we had the same kinds of assurances with programs like the A–12, the tactical standoff surface attack missile and the hunter unmanned aerial vehicle. All of those programs have been canceled, after having cost the taxpayers billions of dollars with very little to show for it.

Unfortunately, the Department's apparent disregard of the congressional role in the case of the joint strike fighter is not unique. I cite as examples the arsenal ship and the joint tactical UAV, which involve hundreds of millions of dollars, likely several billion dollars together, and have, I believe, been inappropriately characterized as advanced-concept technology demonstrators and thereby bypassed the appropriate scrutiny that I believe they deserve.

As I indicated, I am a strong and ardent supporter of acquisition reform, and I am not advocating rigid adherence to milestones and phases, but there must be some rigor to the system to ensure that the threat justifies the requirement; that requirements once established are not changed without the change being reviewed and validated by the Joint Requirements Oversight Council and the Office of the Secretary of Defense; that existing systems or modifications of existing systems are used to meet requirements whenever possible; that we begin new programs only when absolutely required; that affordability determinations are made in the total context of the DOD budget; and that the Congress is provided the necessary information to meet its oversight responsibilities. No other approach will properly serve the Department of Defense or the American public.

The lack of rigor cited by the Commission on Roles and Missions and the General Accounting Office must be corrected. This member has a number of specific concerns, but I will address those after all of our witnesses have had a chance to provide their perspective on this critically important issue. I would also call to the members' attention that there are a number of charts in the packet provided to you. I would ask the review of those numbers to show you the comparisons of what we're spending on tactical aviation now versus the past and, most important, what's projected for the future, especially in light of the current budgetary constraints that are being imposed on us.

Before we begin, does the gentleman from South Carolina, the ranking member of the R&D Subcommittee, wish to make an opening statement?

Mr. SPRATT. Only to thank you, Mr. Chairman, for calling this hearing. It's the kind of hearing that I think we should have. And I'm concerned not only with what we've got programmed in the budget, whether or not we can afford it, but I have also been concerned with what we have been adding to the budget and what the outyear tail and consequences of that are going to be as well. So, I think this is a very timely hearing for us to take stock of where we are, what we are buying and whether or not we can fund it.

Mr. WELDON. I thank the gentleman, and I would also ask for an opening statement, if you would so choose, from our distinguished chairman, Mr. Spence, and thank him for appearing here today.

The CHAIRMAN. No, thank you; I am just pleased to be here and looking forward to the testimony.

Mr. WELDON. Thank you, Mr. Chairman.

Our first panel is composed of representatives of the Congressional Budget Office and the General Accounting Office. Ms. Cindy Williams will lead off for the CBO, followed by Mr. Rich Davis of the GAO. Ms. Williams is joined by Ms. Lane Pierrot and Ms. JoAnn Vines, and Mr. Davis is joined by Mr. Lou Rodrigues. The second panel will include Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology and Gen. Joe Ralston, Vice-Chairman of the Joint Chiefs of Staff. We welcome you all, and we appreciate your appearance before the subcommittees. We will submit your prepared statements for the record and ask that you summarize your statements for our members, and I would add that we will listen to our first panel and then not take questions but call our second panel. Following both panels' presentations, we will then allow you to come back, and we will then have questions from members who may so choose.

And with that, Ms. Williams, you may proceed.

STATEMENT OF CINDY WILLIAMS, ASSISTANT DIRECTOR, NATIONAL SECURITY DIVISION, CONGRESSIONAL BUDGET OFFICE, ACCOMPANIED BY LANE PIERROT, PRINCIPAL ANALYST, NATIONAL SECURITY DIVISION, CONGRESSIONAL BUDGET OFFICE AND JOANN VINES, PRINCIPAL ANALYST, NATIONAL SECURITY DIVISION, CONGRESSIONAL BUDGET OFFICE

Ms. WILLIAMS. Thank you, Mr. Chairman.

Chairman Weldon, Chairman Spence, members of the subcommittee, I am delighted to be here today to discuss our analysis of tactical aircraft modernization and also questions of aging and affordability. I appreciate, Mr. Chairman, that you introduced my companions, Ms. Lane Pierrot and Ms. JoAnn Vines, who conducted the analysis on which my testimony is based.

As you mentioned in your opening remarks, over the next 30 years, DOD plans to replace virtually all of today's tactical aircraft with three new airplanes: the F–22, the F–18E/F, and the joint strike fighter. The Department plans to buy about 4,400 of these new airplanes, and, as you mentioned, CBO estimates the total cost to develop and procure these planes will be about $250 billion in 1997 constant dollars.

The services argue that the advanced technology in these new planes is necessary so that we may maintain an edge over potential threats. But no other country's fighter fleet comes close to that of the United States in either numbers or capability, nor does it seem likely that any country will be able to challenge us, either with their fighter fleets or their air defenses for the foreseeable future.

We have looked at DOD's plans for retiring existing aircraft and replacing them with new ones, and we conclude that the plans would maintain the force structure at planned levels. But DOD envisions keeping planes in its inventory for very long periods in order to make that happen. DOD has usually retired fighter and attack aircraft at about 20 years of age. Current plans call for retaining planes until they are well into their thirties and in some cases forties. The chart over here on my left shows the result of this change in terms of the average of the fleet ages. As you can see, the Navy, shown in blue there, and the Air Force fleets, in red, are both on average about 10 years old today.

Though both age rapidly over the next 10 to 15 years, until they reach unprecedented ages of 19 years for the Air Force, 14 years for the Navy, those ages are greater than the average ages reached by any previous generation of U.S. jet fighters. These high average ages could create problems in the future. For one thing, an older fleet can be more difficult and expensive to operate and maintain. Another concern is that future administrations will just have less flexibility in responding to any unanticipated problems. For example, structural fatigue recognized late in the program is driving the Air Force to retire the A and B models of its F–16's at 4,000 hours rather than the 8,000 hours once planned for.

If similar problems should surface in other aircraft as they age, they might be solved by modifying the airplanes rather than retiring them. But such mods are costly, and current plans, even without any new programs to keep existing aircraft flying, already call for the Department of Defense to devote a larger share of its future budget to tactical aircraft procurement than it has in the past.

CBO calculated the amount of funding that would be available for tactical aircraft procurement if history is a guide for us. We narrowed in on procurement rather than total acquisition funding, because it is difficult to say how much money will be needed for tac air development 15 or 20 years from now. We expect there will be development programs overlapping the joint strike fighter procurement in the outyears, but since the Department of Defense doesn't have any plans for those development programs yet, the comparison I'm going to talk about focuses in strictly on procurement.

So, if you will turn your attention to the second chart, the line on the left, in orange, shows the amount that we have spent each year since 1974 on tactical aircraft procurement. The green line on the right reflects the amount that would be available in the future if the defense budget holds constant in real terms after 2001 and if DOD allocates the same share of its budget to tac air procurement that it has on average in the past.

Now, CBO compared this historical average share to the procurement funding DOD might need for fighter and attack aircraft between 2002 and 2020. Assuming that the Department meets its

goals for production rates and aircraft prices, tactical aircraft procurement needs would range from about $7 billion to about $15 billion a year. This is shown in orange on the right, so you can compare that $7 billion to $15 billion to the green line, which is about $6.6 billion.

Now, the average of this orange need line over there is $9.6 billion a year, 45 percent more than the $6.6 billion historical share figure. This leads us to conclude that DOD's current plans for purchasing the F–22, the F–18E/F, and the joint strike fighter may well be unaffordable, and that's even without possible unforeseen expenses to modify or replace the older aircraft.

Now, the actual situation could be even worse than the orange line shows. The orange line assumes that DOD can meet its price goals for the three aircraft. But our analysis suggests that these goals are very challenging and especially so for the joint strike fighter. The purple line on the chart reflects CBO's independent cost estimate based on historical relationships between aircraft price and design factors, such as weight, speed and complexity. Based on this estimate, annual tac air procurement would cost $11.8 billion on average, and that is about 75 percent more than the historical average share of the constant Defense budget, the $6.6 billion.

Now, of course, DOD could solve this affordability problem simply by allocating a greater share of its budget to tactical aircraft procurement than it has in the past. But this could be hard to do. All of the services expect to increase purchases of a variety of weapons during the next several decades. For example, the Navy expects to purchase about twice as many ships annually between 2002 and 2020 as today, and the Army plans a helicopter modernization program that would double today's helicopter spending. So, competition for resources within the procurement accounts would be severe.

Another idea for solving the affordability problem would be to boost Pentagon procurement funding across the board. In fact, DOD does plan to boost the procurement spending from today's level of about $40 billion to annual levels of about $60 billion. But even at those levels, procurement would constitute a significantly smaller share of the Defense budget than procurement has held on average during past years, and if fighter purchases received their historical portion of this reduced procurement level, DOD would have even less to spend on fighters each year.

Of course, finding that extra $20 billion a year to go from the $40 billion to the $60 billion in procurement will not be easy either. Increasing procurement will come at the expense of other Defense budget needs, including operating funds. DOD and the Congress would need to cut significant amounts of infrastructure and force structure to realize savings of this magnitude from the operating accounts.

The affordability problem will be exacerbated, in fact, if Defense budgets decrease rather than hold steady after 2001, and this scenario doesn't seem totally unlikely. Other portions of the Federal budget, particularly entitlements, could put pressure on future Defense budgets. Unless Medicare and Social Security are substantially changed, the aging baby boomer generation will increase

funding needs for those programs just as requirements for tac air and other planned military purchases are growing.

So, if the Department's plan does prove to be unaffordable, the Congress and DOD may wish to consider alternatives that forego some modernization or restructure the programs or reduce force structure. My written statement suggests a few ideas along these lines. I won't go into all of them here. But I would like to mention one of them as an illustration. One option would be to continue to buy aircraft that are already in production and cancel or scale back the development programs. Keeping current generation planes in production would allow the services to maintain force structure at planned levels; could also avoid substantial fleet aging and reduce spending below the planned levels. This alternative could be acceptable if a highly modernized threat seems unlikely.

So, in summary, the purchases DOD plans would be sufficient to offset expected retirements and keep the forces at the level that the Department says it needs. But they may be unaffordable and thus may well have to be scaled back. Even if purchases are not scaled back, keeping forces at planned levels will mean retaining aircraft to unprecedented ages. If aging leads to unforeseen problems, the Department might have to choose between paying to repair or replace older aircraft and cutting force structure.

At the same time, U.S. fighter fleets are considerably larger and more modern than those of potential adversaries. This suggests that alternatives that accept more modest modernization or smaller improvements in the capabilities of future fighters or smaller forces might be acceptable.

That completes my remarks. We would be happy to answer questions.

[The prepared statement of Ms. Williams follows:]

CBO TESTIMONY

Statement of
Cindy Williams
Assistant Director
National Security Division
Congressional Budget Office

on
Modernizing Tactical Aircraft

before the
Subcommittee on Military Research and Development
and the
Subcommittee on Military Procurement
Committee on National Security
U.S. House of Representatives

June 27, 1996

NOTICE

This statement is not available for public release until it is delivered at 1:00 p.m. (EDT), Thursday, June 27, 1996.

CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515

Chairman Weldon, Chairman Hunter, and Members of the Subcommittees, I am delighted to be here today. At the request of Chairman Weldon and Congressman Spratt, the Congressional Budget Office (CBO) has undertaken a study of our nation's tactical air power. We expect to provide the Committee with the results later this year. Today, I would like to focus on plans to modernize tactical air forces.

The Department of Defense (DoD) plans to acquire three new tactical fighter and attack aircraft for the Air Force, the Navy, and the Marine Corps. The three planes are the F-22 fighter for the Air Force, the F/A-18E/F for the Navy, and the Joint Strike Fighter (JSF)--a multipurpose plane being developed for all three services. DoD expects all three planes to be more capable than the planes they replace.

However, they will also be expensive. DoD plans to buy a total of about 4,400 planes of those three types. CBO estimates that the total cost to develop and acquire them amounts to more than $350 billion, even without factoring in inflation. Over the 1997-2001 period, DoD says, about $34 billion (in 1997 dollars; about $36 billion in current dollars) will be spent for those planes, representing about 9 percent of DoD's planned acquisition spending for the period.

In my testimony, after providing background on these fighter and attack aircraft, I would like to discuss four main points that have emerged from our analysis:

- U.S. fighter fleets outmatch the fighter fleets of any potential adversary; and

- DoD plans to purchase enough tactical aircraft to meet the inventory requirements of its fleets through 2020; but

- The plans assume that tactical aircraft will operate for long periods, and as a result U.S. tactical aircraft fleets will reach unprecedented ages; and finally, but not least,

- DoD's planned aircraft purchases for fighter fleets may prove to be unaffordable.

I will wrap up my remarks with a brief discussion of several policy alternatives that the Congress may wish to consider in addressing those last two points.

DoD's PLANS FOR U.S. TACTICAL AIR FORCES

The Air Force, Navy, and Marines all employ fixed-wing fighter and attack aircraft that fight enemy planes in the air and attack targets on the ground. Current plans--outlined in Secretary of Defense William Perry's 1996 *Annual Report to the President and the Congress*--call for 20 Air Force tactical fighter wings, 11 wings

that operate off the Navy's large deck carriers, and 25 squadrons of fixed-wing fighter and attack aircraft for the Marine Corps. DoD will retain a total of about 3,500 aircraft in inventory to fill out those force levels.

By the end of the year, DoD will operate eight different kinds of fighter and attack aircraft. The bulk of the Air Force fleet consists of F-16s (a small, relatively cheap, multipurpose plane) and F-15s (a larger, more capable, more expensive fighter). The remainder of the Air Force fleet comprises two aircraft dedicated to attacking ground targets: the rugged, tank-killing A-10 and the stealthy F-117.

More than half of the Navy and Marine Corps inventory is made up of F/A-18s, a multipurpose plane (that is, one that performs both fighter and attack roles). It operates both in Navy carrier-based air wings and in fighter squadrons in the Marine Corps. By 1998, only one other fighter or attack aircraft--the highly capable F-14--will operate off the Navy's carrier decks, since the venerable medium-range bomber, the A-6, will have been retired by then. In addition to the F/A-18, the Marine Corps will continue to operate the AV-8B Harrier, which can take off and land in short distances--so-called Short Takeoff/Vertical Landing (STOVL)--and so can fly from the ships that transport marines to amphibious landings.

DoD's plans for modernization call for replacing virtually all of those types of planes with the three aircraft mentioned earlier (see Table 1 for a summary of

procurement costs and quantities for the three planes). By 2020, those three planes will make up more than 80 percent of DoD's aircraft. The department plans to purchase about 4,400 of the new tactical fighter and attack aircraft over the next several decades. The number of aircraft purchased exceeds total requirements because DoD must also buy planes to replace those that are destroyed every year in peacetime accidents. CBO estimates that spending to acquire the new planes will total about $350 billion (unless otherwise noted, all costs are expressed in 1997 dollars).

F-22

The Air Force plans to buy the highly capable F-22 fighter to replace its fleet of F-15s. The first four F-22s are scheduled to be bought in 1999. Procurement quantities will increase annually until 2003, when the plane reaches a peak procurement rate of 48. If the current procurement plan remains unchanged, F-22 purchases will continue until 2010, for a total of 438 planes.

The F-22 will add a number of improvements in capability to U.S. fighter fleets. It will be stealthy--and hence more likely to survive in a dense air-defense environment or to be able to shoot down enemy fighters before they can fire back.

TABLE 1. AIRCRAFT PRODUCTION AND FUNDING ESTIMATES FOR NEW AIRCRAFT

	F-22	F/A-18E/F	Joint Strike Fighter: Air Force	Joint Strike Fighter: Navy	Joint Strike Fighter: Marine Corps	Joint Strike Fighter: All Services	Total
Production Information							
First Production Year[a]	1999	1997	2005	2005	2005	n.a.	n.a.
Number of Aircraft							
Peak production rate (Per year)	48	72	110	12	36	158	n.a.
Total production quantity	438	1,000	2,036	300	642	2,978	4,416[b]
Prices (Millions of 1997 dollars)							
Recurring Unit Flyaway[c]							
Administration's goal	74	46	30	41	38	n.a.	n.a.
CBO estimates	85	46	45	57	50	n.a.	n.a.
Unit Procurement[d]							
Administration's goal	91	61	45	61	54	n.a.	n.a.
CBO estimates	108	61	63	81	68	n.a.	n.a.
Program Funding Totals (Billions of 1997 dollars)							
Estimates Based on Administration's Goals							
Development	22.7	5.7	9.8	9.8	0.1[e]	19.7	48.1
Procurement	40.0	61.2	92.2	18.3	34.3	144.8	246.0
Total	62.7	66.9	102.0	28.1	34.4	164.5	294.1
CBO Estimates[f]							
Development	22.7	5.7	10.7	10.7	0.1	21.5	49.9
Procurement	47.3	61.2	129.2	24.4	43.7	197.3	305.8
Total	70.0	66.9	139.9	35.1	43.8	218.8	355.7

SOURCE Congressional Budget Office based on data from the Department of Defense

NOTES n.a. = not applicable

a Year of planned low-rate initial production

b The Royal Navy in the United Kingdom also plans to purchase Joint Strike Fighters

c Excludes nonrecurring production, support items, and initial spare parts. DoD and the services often use this level of aggregation to discuss aircraft prices

d Total procurement funding divided by total production quantity.

e Marine Corps development share is listed under Navy. This is Advanced Research Projects Agency funding for the Advanced Short Takeoff/Vertical Landing program, a predecessor to the Joint Advanced Strike Technology program.

f Congressional Budget Office estimates assume historical relationships between cost, aircraft weight, and performance

The F-22 will also cruise at supersonic speeds, without needing to resort to afterburners that use up fuel. Moreover, the F-22 will provide its pilots with sophisticated software that will enable them to be very aware of their situation, telling them, among other things, the locations of relevant targets and threats.

The F-22 will also be an extremely expensive plane. Even if its price grows no more than it already has, the Administration estimates that the F-22 will have a unit procurement cost of $91 million compared with about $47 million for the F-15 (see Table 2 for a summary of costs for planes now in the fleet). Acquisition costs, which include the funds to develop and procure the fighter, will total $63 billion--including $15.7 billion that DoD has already spent. CBO constructed an estimate for the fighter's price based on cost-estimating relationships (CERs)--historical relationships between price, weight, and capability. CBO's estimates suggest that it might cost even more--perhaps $108 million per plane.

F/A-18E/F

The multipurpose F/A-18 makes up the bulk of the Navy's aircraft fleet and will continue to do so for the foreseeable future. In 1991, the Navy announced plans to develop a new E/F variant of the F/A-18. The E/F version features several modifications: a longer fuselage, a larger wing, and a more powerful engine than are

TABLE 2. AIRCRAFT PRODUCTION AND FUNDING ESTIMATES FOR AIRCRAFT NOW IN THE FLEET

	F-16[a]	F-15[a]	F-18A/B/C/D	AV-8B
Production Information				
First Production Year[b]	1978	1973	1979	1982
Number of Aircraft				
Peak production rate (Per year)	180	108[c]	84	46
Total production quantity[d]	2,201	1,074	1,015	279
Prices (Millions of 1997 dollars)				
Recurring Unit Flyaway[e]	16	36	29	24
Unit Procurement[f]	23	47	44	34
Program Funding Totals (Billions of 1997 dollars)[g]				
Development	4.2	8.4	6.0	2.5
Procurement	51.4	50.2	44.5	9.5
Total	55.6	58.6	50.4	12.0

SOURCE. Congressional Budget Office based on data from the Department of Defense.

NOTE Numbers may not add to totals because of rounding.

a. All models.

b. Low-rate initial production.

c. Peak rate sustained for only two years (1976 and 1977)

d Extracted from last Selected Acquisition Report (SAR) submitted by DoD.

e. Excludes nonrecurring production, support items, and initial spare parts. DoD and the services often use this level of aggregation to discuss aircraft prices

f Total procurement funding divided by total production quantity.

g Extracted from last SAR submitted by DoD, dollars escalated to 1997 dollars from constant base-year dollars reported in SAR.

on the current C/D model. As a result of the design changes, the plane should be able to carry more weapons than the C/D version or to carry a combat load about 40 percent farther. The plane's new engine should also permit the heavier model to be as agile in flight as were earlier models. The F/A-18's producer is also suggesting that the new plane will be stealthier than older models and thus potentially more survivable in high-threat situations.

The Navy expects to buy 1,000 F/A-18E/Fs beginning next year and continuing through 2015. Since it contains such a large number of planes, the price tag of the F/A-18E/F program exceeds that of the F-22, totaling about $67 billion, even though its unit cost is expected to be lower. CBO's analysis suggests that this estimate is in line with the costs of earlier-model F/A-18s--after adjusting for the E/F's heavier weight.

Joint Strike Fighter

The largest of DoD's development efforts for the three fighter and attack aircraft is for the Joint Strike Fighter--formerly called the Joint Advanced Strike Technology (JAST) program. The JSF is also the plane that is in the earliest stage of development and therefore the least well defined.

The following discussion is based on guidelines for contractors that the JSF program office provided in soliciting development proposals. Goals for performance, cost, and schedule will probably change many times over the life of the development program. Nonetheless, they represent DoD's current thinking about this large development effort.

When DoD announced the JAST program in its Bottom-Up Review, the program was presented as replacing two design efforts--the Multirole Fighter (an F-16 replacement for the Air Force) and the A/FX (an F-14 and A-6 replacement for the Navy). DoD suggested that the other programs would be difficult to afford and that it would emphasize keeping the price down in its new fighter development effort. As a result of Congressional direction, the JSF program also picked up the task of replacing the Marine Corps's STOVL plane--the AV-8B.

Despite the differences in the planes it will replace and the disparity in their missions, the JSF program office expects the JSF's variants to have a high degree of commonality, perhaps as much as 80 percent. According to statements by the program office, since DoD saves money when it buys weapons in bulk, such a high level of commonality will keep JSF prices down. The program will also pursue other strategies to reduce costs. Indeed, one of the program's design requirements is to meet specified unit flyaway costs (a level of spending for aircraft that excludes

development, initial spare parts, and other items that are included in total program costs).

The JSF program office indicates that it may begin buying the fighter in 2005 with initial purchases of 12 planes, divided evenly among the three services. Annual procurement rates would grow to a peak of 158 aircraft. Despite reaching rates that seem high today, when fighter purchases number in the single digits, the huge planned procurement total (about 3,000 planes) means JSF purchases would not be complete until 2030.

DoD has not yet given an estimate for the JSF's total program costs to the Congress. But the program office has given estimates of the unit flyaway costs it is willing to pay for the fighter, as part of its instructions to aerospace companies competing for the contract to develop the concept. According to the program office, it expected to pay $28 million for the Air Force variant, up to $35 million for the Marine Corps version, and $38 million for the Navy variant (those goals are expressed in 1994 dollars).

Since unit flyaway costs do not represent all of the procurement funding actually required to acquire an aircraft, CBO also developed unit procurement costs that include funding that will be needed for spare parts, support equipment, and simulators. In 1997 dollars, DoD's goals for flyaway costs translate to average unit

procurement costs of about $45 million for the Air Force's JSF, $54 million for the Marine Corps's variant, and $61 million for the Navy's design. Procurement funding to achieve DoD's goals totals $145 billion. CBO also estimated 1997 development costs for the program based on an estimate from the Joint Program Office. Combining those estimates leads to a total acquisition cost, based on DoD's goals, of $165 billion.

The program office's goals for costs appear low given the performance goals for the JSF. Consequently, CBO also estimated unit flyaway costs, based on historical cost-estimating relationships, and used those estimates to construct unit procurement costs. CBO's CER estimate suggests that Air Force and Marine Corps JSFs may well cost about $63 million and $68 million, respectively. The Navy's more capable plane may cost about $81 million. CBO estimated that the acquisition cost--for development and procurement funding--could total $219 billion--about 60 percent more than the combined cost of the F/A-18E/F and F-22 programs.

U.S. FIGHTER FLEETS OUTMATCH THE FIGHTER FLEETS OF ANY POTENTIAL ADVERSARY

The need to modernize U.S. forces depends in part on the size and capability of the fighter fleets of potentially threatening countries. It also depends on their air defense capabilities and their plans for modernization. Yet, as a recent RAND publication,

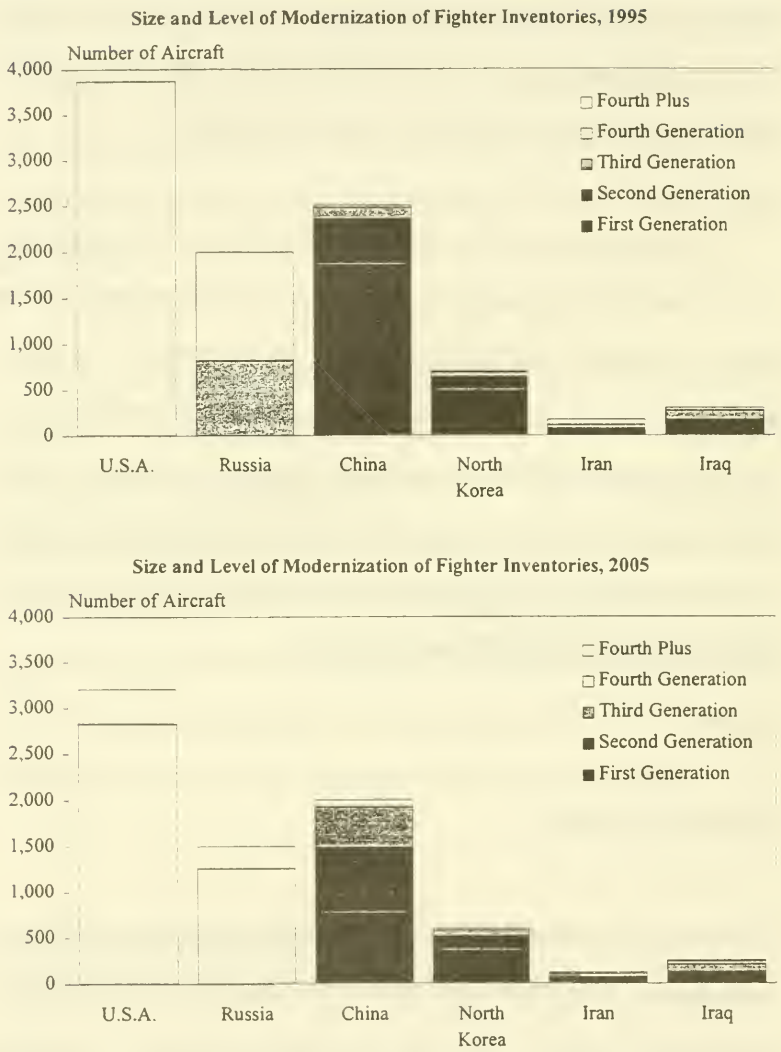
Trends in the Global Balance of Airpower, argues, the United States depends on its airpower to counterbalance enemy ground forces, particularly early in a conflict. Consequently, planners must look beyond balancing enemy fighter and air-defense capability to preserving considerable U.S. superiority in the air.

One problem today with making comparisons between U.S. forces and those of other countries is the uncertainty about which countries constitute potential threats, in contrast to the bipolarity of the Cold War period. The Clinton Administration built on the Bush Administration's strategy of being able to fight in two major regional conflicts at the same time. Planners often assume that those conflicts would be in Southwest Asia--with Iraq or Iran--and on the Korean peninsula with North Korea. Russia and China are also considered by some to be potential threats and possess considerable combat potential.

Trends in Future Fighters

CBO used a recently released Office of Naval Intelligence publication on the size and modernization of the fighter fleets of those five countries as a source for this discussion (see Figure 1). The Navy paper includes estimates of total fighter inventories in each country and also a percentage breakout of those inventories into "generations" that reflect the level of technology incorporated in the aircraft. The

FIGURE 1. TACTICAL FIGHTERS IN SELECTED COUNTRIES



SOURCE: Congressional Budget Office using data from Office of Naval Intelligence, *Worldwide Challenges to Naval Strike Warfare* (January 1996).

Navy presented estimates for 1985, 1995, and 2005. CBO uses those estimates in its forthcoming study, since they are the only unclassified U.S. government projections for foreign fighters.

The Navy's analysis suggests that not one of those countries has an aircraft inventory that approaches U.S. totals. The largest inventories--those in China or Russia--amount to two-thirds the size of U.S. inventories or less. The Navy's estimates exclude dedicated ground-attack aircraft that Navy personnel argue do not threaten naval assets. For that comparison, CBO has therefore excluded dedicated ground-attack planes in U.S. inventories--including the A-6, AV-8B, A-10, F-111, and F-117--from its counts (see Figure 1). Including those aircraft on both sides would probably make the balance even more favorable to the United States.

Compared with U.S. plans to keep a fleet of more than 3,000 aircraft, the inventories of the three countries commonly associated with the Administration's major regional contingencies--Iran, Iraq, and North Korea--have a total of only about 1,200 planes. Moreover, the Navy projects that total inventories in those countries will shrink to less than 1,000 planes by 2005. The fleets of those countries are also not very capable and contain aircraft designed many decades ago. In 1995, they contained only about 100 planes that were the same generation as today's U.S. fighters. By 2005, only about 120 of those planes might come from the same design

era of today's U.S. fighters or be of the same vintage as the planes DoD wishes to purchase.

Air-Defense Modernization

Since U.S. planes may be challenged by ground-based air-defense systems as well as fighters, service planners worry about modernization of air defenses as well. No unclassified government forecasts are available for future air defenses--similar to the Navy's fighter analysis--in potentially hostile countries. But both the Air Force and the Navy have expressed concerns about the possibility of such modernization taking place.

An argument for purchasing stealthy planes such as the F-22, the JSF, and--to a lesser extent--the F/A-18E/F is that they would have a better chance of surviving to attack targets in areas with dense air defense. Improving ground-based air defenses may be a less costly way for potential adversaries to defend themselves against U.S. fighters. DoD is particularly concerned that such adversaries could easily buy cheap "man portable" weapons--namely, weapons that ground troops can carry--that many defense experts expect to proliferate in the future. Of the 25 friendly fighters lost in the war with Iraq, 18 were lost either to those weapons or to the more costly antiaircraft artillery. But both the portable weapons and artillery

have limited ranges. Pilots may be able to fly at altitudes that keep their planes--particularly those that can launch precision-guided weapons--out of the range of those weapons.

Improvements in longer-range surface-to-air missile (SAM) systems--particularly the possibility that hostile countries might acquire the Russian-built SA-12 system--are more likely to put the current generation of aircraft at risk. As it is, the Russian-built systems can fire at aircraft from considerable distances. Improving missile speed and tracking might make them highly dangerous to conventional planes.

Older SAM systems were not particularly lethal in the war with Iraq--shooting down only six planes. Less wealthy countries may find it too expensive to purchase the extensive air-defense networks that make newer systems so capable. Learning to use sophisticated linked networks could also be challenging and expensive for them. Furthermore, developing long-range standoff antiradiation missiles may enable non- or less stealthy U.S. aircraft to develop tactics to attack those SAMs. Enemy SAMs may also make good targets for U.S. cruise missiles.

U.S. Dependence on Air Power

Even if threats do not grow or become more numerous, continuing to field large numbers of highly capable U.S. aircraft offers a number of advantages. For one thing, the United States relies on air power to offset the capabilities of enemy ground forces. Because of that reliance, simply offsetting enemy fighter and air-defense capabilities is not sufficient. Also, aircraft, which can fly to a conflict and require less support equipment than heavy ground forces, can provide firepower earlier in a conflict than any but the lightest Army forces. If early-arriving air power is able to slow or stop attacking forces, it can make rolling back enemy forces easier.

Wars emphasizing the use of airpower may be less likely to result in numerous U.S. casualties. That is always an important concern, but perhaps even more so in today's political environment. During the war with Iraq, the United States engaged in a prolonged bombing campaign that killed or disabled large numbers of enemy forces before beginning the ground offensive. That campaign probably made the task of ground combat forces much easier and saved U.S. lives. For all of those reasons, U.S. leaders may choose to keep large, capable fighter inventories.

DoD'S PLANS MEET INVENTORY REQUIREMENTS THROUGH 2020

CBO projected the size of future U.S. fighter and attack inventories for the 1997-2020 period, using DoD's plans to purchase and retire aircraft. We compared those estimates with the requirements needed to meet the Administration's current goals for fighter forces. According to CBO's analysis, DoD should be able to meet its requirements for force structure.

CBO projects that DoD's planned purchases of F-22s, F/A-18E/Fs, and JSFs should make up most of the shortfall created as the three services retire their older aircraft. At the end of 1997, the Air Force will have about 2,700 planes in its inventory. It needs about 2,050 planes to meet the requirements for its 20 wings and for six squadrons of air-defense fighters in the Air National Guard. Today's surplus of about 600 planes will drop sharply as a result of rapid retirement of early F-16 models. Consequently, by the beginning of the next decade, the Air Force will have a surplus of about 200 planes. Planned procurement will let the service avoid shortages of more than 200 planes for the 2002-2020 period.

The Navy currently has about the number of planes it needs to meet its requirement of around 1,500. That number will slip to 1,400 by 1998. At that time, all carriers will operate with wings that contain only 50 fighter and attack aircraft (compared with the 60-plane wings found on some carrier decks today). The Navy

will experience modest shortages of fewer than 150 planes during the first decade of the 21st century.

U.S. TACTICAL AIRCRAFT FLEETS WILL REACH UNPRECEDENTED AGES

DoD's plans for aircraft purchases should permit it to support its force goals. Nonetheless, it will need to keep planes in the fleet for unusually long periods to do so. The large number of older aircraft will drive the average age of DoD's fleets to unprecedented levels.

CBO's forecasts of future inventories depends on a number of assumptions made by the services. One particularly important assumption is service life--a projection of the number of hours a plane will be able to fly before it experiences structural fatigue. Service planners translate those numbers into a forecast of when the planes in today's fleets will retire. Both the Air Force and the Navy are expecting to retain planes longer than they have in the past. Historically, DoD has planned to retire fighter and attack aircraft when they reach about 20 years of age. But current plans call for retaining planes until they are well into their 30s, and in some cases even 40s.

The military's estimates of service life may prove to be accurate. In designing the planes that are in the fleet today, DoD may have placed more emphasis on retaining planes for longer periods than it did for past generations of aircraft. Also, improvements in computer modeling and simulation--which lie at the heart of those estimates--may enable engineers to construct better estimates than they did in the past of how long planes will last.

Nevertheless, DoD could also be overly optimistic. In several recent situations, DoD retired planes that it had originally planned to keep for long periods. One example is the Air Force's F-16A/B model.

Several years ago, the Air Force expected the entire F-16 fleet--A/B and C/D models--to last 8,000 flying hours (about 30 years at expected annual flight rates). But recently the Air Force discovered that the F-16A/B fleet was experiencing unanticipated structural fatigue. After studying the issue, the Air Force decided that repairing the F-16 would be more expensive than it was worth and decided to retire the plane after 4,000 flight hours. Some analysts have argued that similar problems may be encountered with the F-16C/D, since testing for fatigue performed during the plane's development examined only a portion of the airframe.

Unfortunately, the F-16 is not an isolated example. The Navy also recently accelerated the A-6's retirement. In addition, the Air Force changed its plans for the

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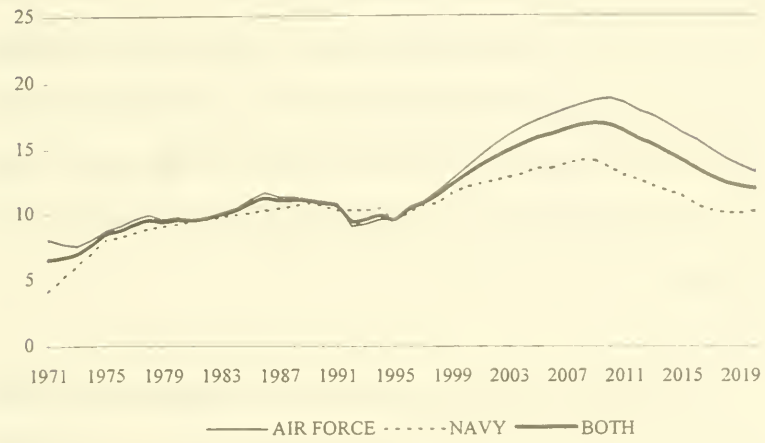
long-range F-111, shortening its expected service life. Those two examples may be based more on a desire to cut operating costs or worries about vulnerability to enemy air defenses than on misjudgments about structural strength.

Planned service lives are longer than they have been in the past. As a result, fleets will age. Navy and Air Force fleets are, on average, about 10 years old today (see Figure 2). They will age rapidly over the next 10 to 15 years of low planned purchases. Average ages in the Air Force will be higher than those in the Navy and Marine Corps, exceeding 15 years by around the middle of the next decade. That average age will climb to 19 years by 2010, before it begins to decline as large numbers of Joint Strike Fighters reach operational status. The Navy's fleet--which will receive infusions of large deliveries of F/A-18E/Fs in the early years of the next decade--will remain relatively younger, reaching an average age of about 14 years around 2005. It will remain at that level until it begins declining in 2010, when the Navy too receives JSF deliveries in quantity.

DoD uses the average age of its aircraft fleet as a measure of modernization and a proxy for obsolescence of large blocks of the fleet. In the past, DoD officials have also argued that aging fleets will be less capable in combat, since enemy fleets and air defenses will modernize. The services also express concern that older fleets will be more difficult to operate and more expensive to maintain.

FIGURE 2. HISTORICAL AND PROJECTED AVERAGE AGES OF FIGHTER AND ATTACK AIRCRAFT, 1971-2020



SOURCE: Department of Defense, *Annual Report to the President and the Congress* (March 1996) and Congressional Budget Office.

CBO estimates that the ages of the fleet in the Administration's plans will be greater than those of U.S. tactical fighter fleets at any point in history--at least since the advent of the jet engine. According to DoD's estimates, the Air Force fighter fleet had an average age of about eight years in the 1970s and about 10 years in the 1980s. With an average age of less than five years at the beginning of the 1970s, Navy inventories aged to about eight years in the late 1970s and to about 10 years in the 1980s.

Yet, as with increases in expected service life that underlie them, such trends in aging may be of less concern than they were during the Cold War. They also may be less of a problem if one believes that estimates of service life are more accurate than they have been in the past because of better modeling.

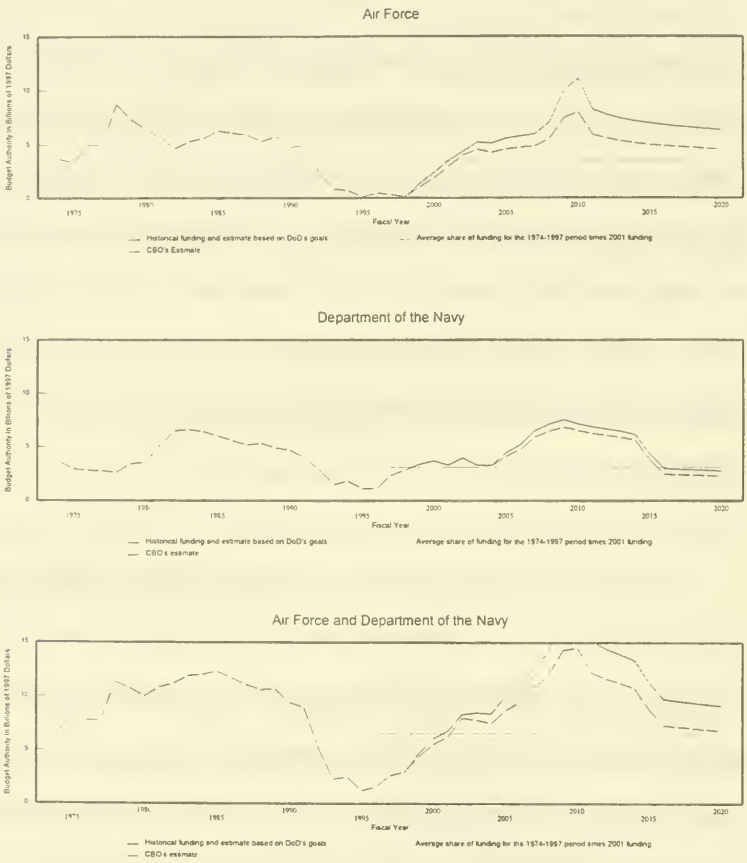
Nonetheless, aging fleets suggest that future Administrations will have less flexibility in responding to unanticipated structural fatigue problems such as those recently encountered with the F-16A/B. If modifications become necessary to keep old planes in the fleet, they could add substantially to funding requirements for fighters. For example, the Marine Corps's "remanufacture" of the AV-8B fleet (an extensive modification program to update and extend the plane's service life) costs about $30 million on average, almost as much as the plane cost to buy originally.

DoD'S PLANS MAY PROVE TO BE UNAFFORDABLE

If problems develop with the aging fleet, adding to funding for fighter planes could pose serious difficulties. The Administration's current plans to modernize will already be costly. CBO estimated future funding required for purchases of the three new planes in the Administration's current plan. It then compared that amount with the funding that might be available if DoD allocated the same share of its future budget to fighter and attack aircraft purchases as in the past. For that base case, CBO's estimates of fighter costs are based on DoD's goals rather than on CBO's CER estimates.

On average, the Air Force and the Navy spent about 4.6 percent and 4 percent, respectively, of their annual budgets on purchasing fighters over the 1974-1997 period. CBO applied those percentages to the Administration's plans for service budgets in 2001--the last year of currently available plans. That estimate suggests that the services might have about $3.5 billion and $3.1 billion, respectively, or a total of about $6.6 billion, to spend for fighters each year (see Figure 3). The current plan would require spending an average of about $9.6 billion annually over the 2002-2020 period to buy fighter and attack aircraft--that is, almost $3 billion more than might be available if the defense budget remained level in real terms after 2001 and fighters got the same share as previously.

Figure 3. Historical and Projected Funding for Fighter and Attack Aircraft


Air Force
Budget Authority in Billions of 1997 Dollars
Fiscal Year
Historical funding and estimate based on DoD's goals
CBO's Estimate
Average share of funding for the 1974-1997 period times 2001 funding
Department of the Navy
Budget Authority in Billions of 1997 Dollars
Fiscal Year
Historical funding and estimate based on DoD's goals
CBO's estimate
Average share of funding for the 1974-1997 period times 2001 funding
Air Force and Department of the Navy
Budget Authority in Billions of 1997 Dollars
Fiscal Year
Historical funding and estimate based on DoD's goals
CBO's estimate
Average share of funding for the 1974-1997 period times 2001 funding

SOURCE Congressional Budget Office

Assumptions That Could Make Plans More Affordable

Making different assumptions might yield different conclusions--namely, that more money would be available for future fighter procurement. One might argue, for example, that comparing future funding for fighter and attack aircraft with past shares allocated to them could be pessimistic. DoD could choose to allocate a larger share of its budget to fighters--cutting spending for other parts of its budget. If even modestly increased percentages of service budgets were given to funding tactical fighter aircraft, DoD might be able to afford its current plans.

However, DoD has other modernization programs planned. For example, the Navy expects to purchase 10.6 ships a year on average during the 2002-2020 period--about twice as many as it plans to purchase during the 1997-2001 period. In addition, the Army plans a helicopter modernization program that would require double today's spending on helicopters during the first decade of the next century.

One could also assume that total defense budgets would increase. For the scenario discussed above, CBO assumed that DoD budgets would receive no real increases in funding beyond 2001. A look at past budgets suggests that defense budgets have never gone through such a long period with no growth in funding. As a result, future budgets may indeed grow. In fact, if allocated to purchases of tactical

fighters, even modest real increases in DoD funding could make the current plans more affordable.

Assumptions That Could Make Plans Less Affordable

Other assumptions would darken the outlook for affordability. DoD's budgets could decline. Also, the department could spend less on procurement accounts in the future than it did over the historical period of CBO's analysis. Moreover, fighter planes could lose their current share of the budget to other weapons. Finally, they could cost more to acquire than DoD's goals would imply.

Defense budgets are at least as likely to decrease in real terms as to grow. For example, in the next decade if the Congress and future Administrations make tax cuts while reaching and retaining a balanced budget, defense may receive real reductions. Indeed, the budget resolution--the Congress's current road map for federal spending and revenues into the next century--assumes real declines in defense funding authority for several years. Also, other portions of the budget may put pressure on future defense budgets. Unless Medicare and Social Security are changed substantially, the aging baby-boom generation will increase funding needs for those programs during the same period that requirements for fighter purchases are growing. Perhaps for all those reasons, at least one industry forecast--prepared by the

Electronics Industry Association--accords high probability to forecasts of real declines in DoD's funding around the turn of the century and beyond.

Procurement accounts could also receive smaller shares. CBO's analysis implicitly assumes that procurement accounts return to the shares they have received historically. But that goal may be difficult to achieve. Not surprisingly, during the "procurement holiday," procurement funding received historically low shares. It amounts to only about 16 percent of the Administration's 1997 budget request, in contrast to about 23 percent in 1980, 33 percent in 1985, and 26 percent in 1990.

A number of DoD officials have pointed out that they intend to increase spending on procurement during the next five years, ending with a total of $60 billion in 2001 (in current dollars)--about 40 percent higher than today's level. But even if they succeeded, and it might be tough, procurement would still amount to only about 22 percent of the budget--considerably more than today but considerably less than it received during past years. If purchases of fighter and attack planes received their historical share of that reduced procurement share, DoD might have only about $5.5 billion to spend on them each year, about $1 billion less than CBO assumed above.

Achieving even the increases in procurement funding in the Administration's plans may be difficult. Since the defense budget in those plans is no higher in real terms in 2001 than it is today, the increase in procurement comes at the expense of

cuts elsewhere in the budget--partly out of development and military construction funding but also out of operating funds. Those funds pay for a number of things, including sums to operate and maintain DoD's forces and costs for DoD's infrastructure. But most of the planned cuts in forces have already been made. DoD will already need to pare infrastructure and trim operating costs significantly to accomplish its plans.

To increase procurement above currently planned levels, even more aggressive trimming of operating accounts would be needed. But recent trends in operating funds suggests that they are increasing rather than decreasing. In addition, the Administration and the Congress have found it difficult to consolidate operations and close bases in the past. Therefore, the hope that procurement could wrest even larger shares of future budgets is unlikely to be fulfilled unless future Administrations and Congresses make significant changes in the way DoD is structured and provides services, or make further large cuts in forces.

As I mentioned earlier, purchases of fighter planes could lose out to ships and helicopters. Increased funding for space-based programs, long-range bombers, or airlift aircraft may come out of funds for fighter planes. Although some mission areas--such as antisubmarine warfare--have received reduced emphasis at the end of the Cold War, others, such as mobility, have increased in importance.

DoD may also need to pay more for the planes it purchases. DoD's price goals--particularly for the Joint Strike Fighter--assume that the department will be able to break away from historical relationships between cost and capability and aircraft weight. DoD's JSF estimate assumes that it will get a number of improvements in performance, including stealth, with no cost penalty. Since the Administration argues that it will place considerable emphasis on keeping prices down in its design programs, CBO has included DoD's estimates. Yet history offers little hope that such an endeavor might succeed.

CBO also estimated prices for those planes using historical cost-estimating relationships. Its analysis suggests that only one plane, the F/A-18E/F, has costs that reflect historical CERs. The F-22's price is modestly underestimated and could rise to about $108 million if CERs prove to be better price predictors than the estimating methods DoD used.

However, the biggest change would be in the cost of the Joint Strike Fighters. Total procurement costs could be about 35 percent higher than current estimates--rising to about $197 billion. CBO's higher, but more realistic, estimate would suggest that DoD may need about $11.8 billion per year--or 75 percent more than the $6.6 billion historical share.

ILLUSTRATIVE ALTERNATIVES

Since the Administration's plan is likely to be difficult to afford, the Congress and DoD may wish to consider alternatives. A forthcoming CBO study for this Subcommittee will evaluate several alternatives in some detail.

One way to keep force size up and avoid substantial fleet aging, while holding funding down, would be to continue purchasing aircraft that are already in production--and cancel or scale back the development programs. For example, the General Accounting Office has proposed that DoD continue to purchase the current-generation F/A-18C/D instead of buying the E/F. This Committee's authorization bill included such an option in an independent study of alternatives to current plans for fighter modernization. Moreover, keeping the current generation of planes in production may be acceptable to people who feel that extensive modernization on the part of potential adversaries is unlikely.

Another alternative would be to restructure planned development. For example, DoD might be able to avoid some research and development costs by designing variants of planes that are farther along in the development process and purchasing more of them. Such a strategy--similar to the Navy's approach when it decided to modify the F/A-18E/F and use it for a larger portion of its carrier-based aviation fleet instead of building a new plane--would probably be almost as costly

as CBO's estimate based on DoD's price goals. But it would entail less risk of prices escalating. It would, moreover, permit DoD to field a highly capable fleet.

Alternatives that emphasize modernization but make cuts in forces also merit attention. Some critics of the size of DoD's air forces have argued that considerable duplication of effort exists in that area. DoD could place priorities on its force requirements and consequently modernize and retain only the highest-priority forces. Alternatively, DoD could pursue all of its efforts to modernize, but purchase all planes at reduced quantities and accept whatever force reductions occur. Some decisionmakers perceive such a strategy as the fairest approach to making programmatic funding cuts, since it taxes all participants equally. But since the unit price rises when fewer planes are purchased than anticipated, that option provides the least capability for the price of any alternative considered.

CONCLUSION

To summarize, CBO's analysis suggests that DoD's current plans for fighter purchases pose a number of problems. If they actually occurred, planned purchases would meet requirements. They would also produce a very capable fleet. But CBO's analysis suggests that they may not be affordable and will probably need to be scaled back in some way. The aging of the fleet is also worrisome, suggesting as it does

that future leaders could have less flexibility in dealing with funding cuts. They may need more money and have less.

At the same time, U.S. fighter fleets are considerably larger and more modern than those of potentially threatening countries. That situation suggests that alternatives that accept more modest modernization, smaller improvements in the capabilities of future fighters, or smaller forces may be acceptable.

Mr. WELDON. Thank you, Dr. Williams. Ms. Pierrot and Ms. Vines, we appreciate your involvement here. Would either of you like to add or make additional comments or statements at this point in time?

Ms. PIERROT. No, thank you.

Ms. VINES. No, thank you.

Ms. PIERROT. We appreciate being here.

Mr. WELDON. Well, we appreciate having you here to answer questions that might come up.

Mr. Davis, we'll turn to you now.

Mr. DAVIS. Thank you, Mr. Chairman. Chairman Spence, other members of the subcommittee——

Mr. WELDON. Just for the record, I should have asked Dr. Williams to state this. Would you both just give us your titles, Dr. Williams again from the Congressional Budget Office, so members understand your position?

Ms. WILLIAMS. Yes; I'm Assistant Director of the Congressional Budget for national security.

Mr. WELDON. Thank you; and Mr. Davis?

Mr. DAVIS. I'm the Director for National Security Analysis. And Mr. Rodrigues is with me. He is the Director for Defense Acquisition issues in our office.

Mr. WELDON. Thank you.

STATEMENT OF RICHARD DAVIS, DIRECTOR OF NATIONAL SECURITY ISSUES, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY LOUIS RODRIGUES, DIRECTOR OF DEFENSE ACQUISITIONS, GENERAL ACCOUNTING OFFICE

Mr. DAVIS. I'm pleased to be here today to discuss the challenges that the Department of Defense faces in ensuring effective combat air power capabilities for the future. My testimony is based on a comprehensive report of the major issues related to U.S. combat air power that we expect to issue in September.

Today, I would like to summarize four primary messages from this work and illustrate them with some charts. The first point I would like to make is although U.S. aircraft inventories have declined since the gulf war, DOD has added many new aircraft to its fleet and has qualitatively improved the capabilities of its remaining aircraft and other air power assets. As you can see from the chart on my left, from a quantitative standpoint, the chart shows that U.S. aircraft inventories have declined about 35 percent since the gulf war, from about 8,200 to about 5,900.

Most of the aircraft that have been retired were older and costly to operate and maintain, systems like the A–4's, the A–6's, the A–7's, the F–4's, et cetera. At the same time, many newer and more capable aircraft have been added, such as the F–15's, F–16's and F–18's. From a qualitative standpoint, DOD has improved some of the key capabilities that this air fleet has. Coming out of the gulf war, they identified a number of things that they would like to have in their fleets, and this chart identifies some of them. You can see long-range missiles, the increases that have occurred in the inventories since the gulf war; the night-fighting aircraft; there are many more night-fighting capable aircraft today in the fleet than were at the time of the gulf war, and that's also true for aircraft

that can deliver precision-guided munitions. Our conclusion is that DOD's current force remains highly capable and is more capable in many areas than the larger cold war force.

The second issue that I would like to emphasize is that potential adversaries that the United States may face in regional conflicts are far less capable than the former Soviet Union. They have fewer, older, less capable assets, and several factors are likely to inhibit them from improving their capabilities quickly. The lack of indigenous capability to produce advanced systems and international arms control efforts through the United Nations, the Wassanaar Arrangement and the Missile Technology Control Regime will serve as obstacles to improvement.

Another important obstacle is the change in the international arms market. This chart shows that arms transfers during the period of 1987 to 1994 have fallen significantly, and it is not expected to change any time soon. You can also see that the arms market is dominated by the United States and its allies. The Soviets and the Russian arms transfers fell from about $29 billion in 1987 to less than $2 billion in 1994.

Although the use of air power assets in isolated terrorist actions cannot be ruled out as a potential danger, DOD believes that it is unlikely that the nations considered to be potential adversaries could prevent U.S. forces from achieving their objectives in a military engagement.

The third point I would like to emphasize is that DOD faces a major challenge in seeking to finance all of its combat air power investment programs. We believe DOD should reexamine its plans in view of the considerable edge U.S. forces have now against potential adversaries and the strong likelihood that this relative strength will continue. This chart shows that as part of our evaluation of the interdiction mission, we found that DOD has extensive overlapping capabilities yet plans to invest several hundred millions of dollars to further improve these capabilities. As you can see from this chart, each service has multiple ways to interdict enemy ground targets: fixed-wing aircraft, helicopters, missiles, et cetera.

During our review of the interdiction mission, we also found that DOD considers its current capability to successfully meet its interdiction requirements for two major regional conflicts. We also noted that the Commission on Roles and Missions, Mr. Chairman, that you mentioned in your opening statement that was issued in May 1995, reported that DOD already may have more strike aircraft and weapons than it needs. Our analysis of service data showed that they have more than enough capability to hit identified targets for two MRCs.

Our work has demonstrated that some programs, such as the F/A–18E/F, would only marginally improve existing capabilities at a very high cost. This seems to be at odds with the national military strategy that cautions against making major new investments unless there is a substantial payoff. Other programs, such as the F–22, were planned to respond to the Soviet threat and may no longer be needed within the timeframes currently planned in view of the changed security environment.

Our conclusion is that while these programs add capability, it is not clear that this added capability is needed. By reexamining its

plans, DOD might find that it could forego some investments. This would narrow the gap that exists between planned programs and expected budgets.

The final point that I would like to make this afternoon is what I believe is our most important point. It deals with the process. We have found that DOD is proceeding with major air power programs without having sufficiently assessed existing aggregate capabilities in relation to joint mission requirements. Our comprehensive report will show some of the problems that exist in the programming and budgeting process have existed for many years. The services continue to dominate the process; the analysis of mission areas is weak, and a stronger joint perspective on requirements, programs and budgets is clearly needed.

The Department has moved to create a joint war fighting capability assessment process, and we believe that is a step in the right direction. However, their work is still evolving, and so far, the teams have not identified ways to reduce unneeded overlaps in capability or examined how best to recapitalize the force. Until the Department begins to make broader, more comprehensive assessments of individual mission areas, the Secretary of Defense will continue to lack the information he needs to make key decisions on air power programs and budgets. This last chart outlines what we see as the major elements of the joint assessments that we envision. To be of most value, the assessments should be done on a continuing basis and should assess total joint war fighting requirements in each mission area; inventory aggregate service capabilities; compare aggregate capabilities to joint requirements to identify excesses or deficiencies; where excesses exist, assess the relative merits of retiring alternative assets, reducing procurement quantities or canceling programs and determine the most cost-effective way to satisfy any deficiencies.

In conclusion, I would underscore that DOD should make air power investments that are matched to identify needs. Funds spent on programs that add little needed capability at a very high cost when existing capabilities may already be sufficient to meet future challenges are, in our opinion, funds not well spent. We agree that overlapping capabilities provide combatant commanders with desirable operational flexibility, but the question is whether, in the post–cold war era, the United States needs or can afford the current levels of overlapping redundancy.

To be in a position to make sound investment decisions, DOD needs to closely examine each of its planned investments within the context of military need, likely budgets, and a changed security environment. Our work has led us to conclude that broader, more comprehensive assessments in key mission areas are needed if the Secretary is to make the difficult tradeoff decisions that he is likely to face in modernizing U.S. forces.

However, better assessments are not all that's needed. Certain longstanding obstacles must be overcome if the key challenges related to air power are to be met head on. The Chairman, JCS, must be a strong advocate for the joint perspective as the Goldwater-Nickles legislation intended. The interests of the U.S. military as a whole must be placed above the interests of the individual services, and if circumstances change, and program adjustments are

needed, the Secretary and the Chairman of the JCS must be willing to challenge the strong proponents that develop around major acquisition programs.

If the DOD is to shape its force smartly within the bounds of likely budgets, existing levels of redundancy and capability must be questioned, and no program once begun should be considered irreversible. Mr. Chairman, that completes my comments to the subcommittee.

[The prepared statement of Mr. Davis follows:]

United States General Accounting Office

GAO

Testimony

Before the Subcommittees on Military Research and Development and Military Procurement, Committee on National Security, U.S. House of Representatives

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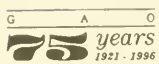
COMBAT AIR POWER

Joint Mission Assessments Needed Before Making Program and Budget Decisions

Statement of Richard Davis, Director, National Security Analysis, National Security and International Affairs Division



GAO/T-NSIAD-96-196

Mr. Chairman and Members of the Subcommittees:

I am pleased to be here today to discuss the challenges that the Department of Defense (DOD) faces in ensuring effective combat air power capabilities for the future. My testimony is based on a comprehensive report of the major issues related to U.S. combat air power that we expect to issue in September. This report will synthesize the findings from our reviews of six key air power mission areas[1] conducted over the past 2 years and other recent reviews of individual weapon systems. The overall objective of our work was to determine whether the Secretary of Defense has sufficient information from a joint perspective to help him decide whether new air power investments should be made, whether programmed investments should continue to be funded, and what priority should be given to competing programs. To provide context for this assessment, we examined major changes in U.S. air power capabilities since the Persian Gulf War in relation to those of potential adversaries.

Today, I would like to make four points based on our work:

1. Although U.S. aircraft inventories have declined since the Gulf War, DOD has added many new aircraft to its fleet and has qualitatively improved the capabilities of its remaining aircraft and other air power assets. As a result, DOD's

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[1]These include interdiction, air superiority, close support, air refueling, suppression of enemy air defenses, and surveillance and reconnaissance.

current force remains highly capable and is more capable in many areas than the larger Cold War force.

2. With the end of the Cold War, U.S. forces may face potential adversaries far less capable than the former Soviet Union. These nations' forces are considerably smaller, older, and less capable than U.S. forces, and information suggests that they are likely to be slow to improve their capabilities. And, while isolated terrorist actions cannot be ruled out, DOD believes that it is unlikely that these nations could prevent U.S. forces from achieving their objectives in a military engagement.

3. As the nation attempts to achieve a balanced budget, DOD faces a major affordability challenge in seeking to finance all of its combat air power investment programs. At the same time, our work shows that some programs would only marginally improve existing capabilities at a very high cost. Others may no longer be needed in view of the changed security environment. And, for some programs, less costly alternatives could be pursued to meet identified needs.

4. Our work suggests that DOD is proceeding with major air power programs without having sufficiently assessed its joint mission requirements to meet post-Cold War needs. Without such assessments, the Secretary of Defense does not have the

information needed to render accurate assessments of the need for and priority of planned investment programs.

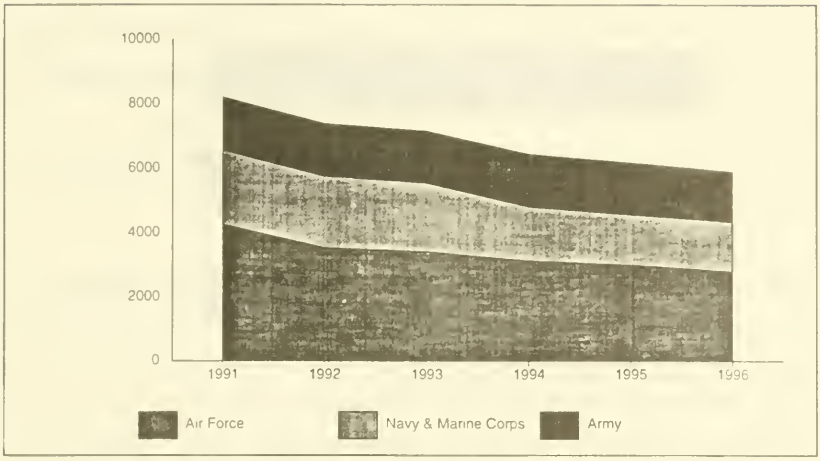
I would like to elaborate on each of these issues. But before I begin, I must tell you that to keep my testimony unclassified, I will be more general than I would prefer. This is particularly true in my discussion of the capabilities of potential adversaries. Also, although our comprehensive report defines U.S. air power more broadly, my testimony today will focus primarily on fighter and attack aircraft, attack helicopters, bombers, munitions employed by combat aircraft, and long-range missiles.

ALTHOUGH SMALLER, CURRENT U.S. AIR POWER FORCES REMAIN HIGHLY CAPABLE

Despite downsizing, U.S. forces remain highly capable. While DOD has reduced its number of combat aircraft, it has retired some older aircraft while adding new aircraft and enhancing the capabilities of existing aircraft. These actions have yielded a force that, in many areas, is more capable than the larger Cold War force.

DOD's total inventory of combat aircraft has declined from about 8,200 in 1991 to about 5,900 in 1996 as shown by figure 1. The quantities shown include aircraft designated for operational missions as well as aircraft set aside for testing and training.

Figure 1: Changes in DOD's Inventory of Fighter and Attack Aircraft, Attack Helicopters, and Bombers, 1991-96



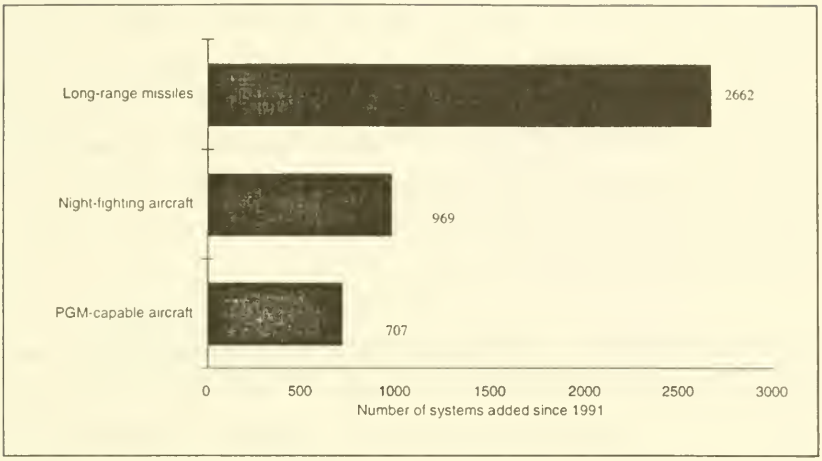
Source: Department of the Army, Navy, and Air Force.

Air Force, Navy, and Marine Corps fixed-wing fighter and attack aircraft have been reduced the most--from about 6,200 in 1991 to about 4,100 in 1996. The services have achieved these reductions primarily by retiring older aircraft that have been costly to operate and maintain. At the same time, they have added many newer model aircraft--about 70 F-15E strike fighters, about 250 F-16 multi-mission fighters, and about 200 F/A-18 fighter and attack aircraft. These assets have bolstered U.S. combat air capabilities.

The total number of attack helicopters has only declined by 79. This smaller reduction is due to the fact that although 600 older AH-1 Cobras were retired, both the Army and the Navy have added newer more capable helicopters. These include about 150 Apache attack helicopters and 300 OH-58D Kiowa Warrior armed reconnaissance helicopters in the Army and about 70 Cobras in the Marine Corps.

Although DOD now has fewer aircraft, many of the aircraft being retained have been qualitatively improved. For example, DOD has improved the navigation, night fighting, target acquisition, and self-protection capabilities of many aircraft and has made more aircraft capable of delivering advanced munitions. These were capabilities that contributed significantly to the effectiveness of tactical aircraft in the Gulf War. DOD is also substantially increasing its inventory of long-range missiles and precision-guided munitions (PGMs). It is presumed that the growth in PGMs could reduce the number of flights and aircraft needed to destroy designated targets. Figure 2 shows the added capabilities in these areas since 1991.

Figure 2: Increases in Key Combat Air Capabilities Since 1991



Note: Long-range missiles include the Tomahawk cruise missile and the Army Tactical Missile System. Night-fighting aircraft includes those designed to permit use of night-vision goggles and/or those equipped with infrared detection devices. PGM capability refers to the ability of aircraft to autonomously employ precision-guided munitions using laser designators.

Source: Departments of the Army, Navy and Air Force

FORCES OF POTENTIAL ADVERSARIES ARE LIMITED AND LIKELY SLOW TO IMPROVE

Based on DOD data and information from other government sources, DOD does not believe that potential adversaries possess the capabilities needed to prevent U.S. forces from achieving their military objectives.

Regarding offensive capabilities, although some potential adversaries have significant numbers of aircraft, none has an

inventory that approaches that of U.S. forces. Also, their aircraft are generally older and technologically inferior to U.S. aircraft. Some possess significant quantities of conventional theater ballistic missiles, however, these missiles are often relatively unsophisticated. The United States does not currently face a significant threat from enemy cruise missiles, and such capabilities are not likely to increase until the middle of the next decade, if at all.

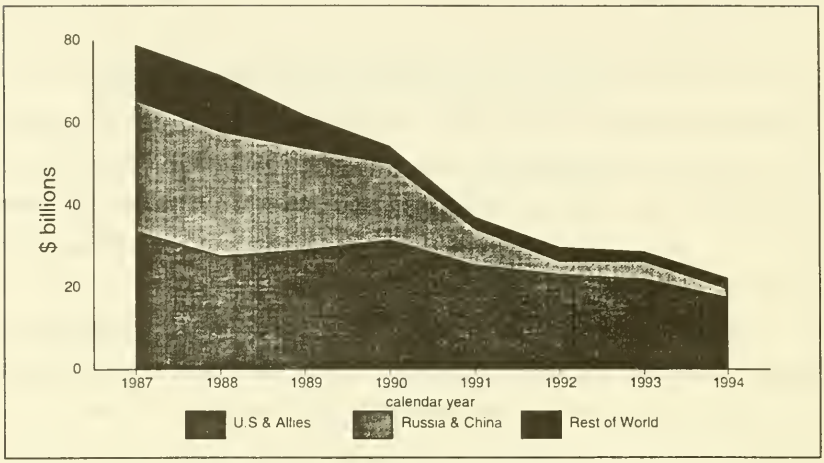
Regarding defensive capabilities, potential adversaries have few modern fighters suitable for air defense. The bulk of their forces are older, less capable aircraft, and information suggests that they will not be adding many modern aircraft. Similarly, they generally rely on older surface-based air defense systems for high-altitude long-range defense. It is believed that potential adversaries are trying to improve their air defense capabilities by upgrading their existing systems, purchasing more modern weapons, and using camouflage and decoys. But, DOD believes that, even with improvements, it is unlikely that potential adversaries could prevent U.S. forces from achieving their objectives.

Several factors are likely to inhibit these nations from improving their capabilities quickly. First, they lack the indigenous capability to develop and produce the advanced systems that would permit them to significantly enhance their capabilities. Therefore, advances will likely be confined to upgrades of existing

equipment and the possible acquisition of advanced systems from outside sources.

Second, worldwide arms transfers have fallen significantly in recent years and are not expected to reach former levels any time soon. Unlike the former Soviet Union, Russia normally requires payment for its weapons transfers. As a result, its arms transfers fell from $29 billion in 1987 to only $1.3 billion in constant 1994 dollars. From 1992 to 1994, Russia exported a total of 30 fixed-wing combat aircraft to developing countries. China has also reduced its arms exports. Figure 3 illustrates both the decline in the international arms market between 1987 and 1994 and the dominance of Western suppliers.

Figure 3: Trend in the Worldwide Transfer of Conventional Arms, 1987-1994 (constant 1994 dollars)



Source: 1994-1995 World Military Expenditures and Arms Transfers, Arms Control and Disarmament Agency.

Third, the United States and its allies are cooperating to limit conventional arms transfers to certain nations. For example, the United Nations imposed sanctions on several nations in the 1990s. These sanctions prohibited the transfer of weapons or commercial technology that could be used for military purposes to these nations. No measurable arms transfers were made to these nations after the sanctions were imposed. Similarly, 28 nations signed the Wassanaar Arrangement in December 1995. Under this arrangement, the major arms producers agreed to refrain from exporting arms and dual-use technology to certain nations. In addition, the Missile Technology Control Regime, created in 1987, is specifically

designed to limit the transfer of missiles, including cruise and theater ballistic missiles, and related technology. Taken together, the U.N. sanctions, the Wassanaar arrangement, and the Missile Technology Control Regime pose obstacles to potential adversaries seeking to acquire highly-capable weapons and advanced technology.

Fourth, the high technology weapons that could seriously threaten U.S. air power are expensive, no matter what the source. For example, aircraft that are part of the original Eurofighter 2000 tactical aircraft contract are projected to cost about $75 million each. An advanced air defense system like the Patriot PAC-3 costs over $100 million for each battery. Given the state of the economies of potential adversaries, it would be difficult for them to purchase many high-cost systems.

To summarize, although the use of air power assets in terrorist actions cannot be ruled out as a potential danger, available information suggests that no potential adversary possesses sufficient capabilities to prevent U.S. forces from achieving their objectives in a military engagement. Efforts by these countries to modernize their forces will likely be inhibited by declines in the post-Cold War arms market, national and international efforts to limit the proliferation of conventional arms, and the high cost of advanced weapons.

DOD FACES CHALLENGES IN MODERNIZING ITS COMBAT AIR FORCES

Although U.S. air power capabilities are already substantial--particularly in relation to the threat, DOD has planned major air power modernization programs in some areas to attain even greater capabilities. These modernization plans center on several very expensive aircraft development programs--the Navy's F/A-18E/F fighter/attack aircraft; the Air Force's F-22 air superiority fighter; the Army's Comanche armed reconnaissance helicopter; and the Joint Strike Fighter.

Table 1 summarizes the estimated costs of DOD's major air power modernization programs. We have not included the Joint Strike Fighter in this table because the program is still being defined and cost estimates are preliminary. However, current plans are to develop and procure about 2,800 new aircraft for the Air Force, Navy, and Marine Corps. According to DOD, the unit flyaway cost of the Joint Strike Fighter is expected to range from about $29 million to $40 million (expressed in 1996 dollars) depending on the service model procured and the contractor selected. If these plans proceed, the Joint Strike Fighter would become DOD's costliest aircraft modernization program.

Table 1: Estimated Costs of Major Air Power Investment Programs (as of Dec. 31, 1995)[a]

Then-year dollars in billions

Program	Through FY 1996	FY 1997 to end of program	Total
F/A-18E/F	$4.9	$76.1	$81.0
F-22	14.0	56.1	70.1
Longbow Apache	1.9	6.4	8.3
Comanche[b]	3.1	41.7	44.8
B-1 bomber modifications	1.3	2.5	3.8
AV-8B remanufacture	.5	1.8	2.3
Weapons[c]	23.9	20.9	44.8
Total	**$49.6**	**$205.5**	**$255.1**

[a]Excludes Joint Strike Fighter.
[b]Data as of June 1996.
[c]Includes Tomahawk, Longbow Hellfire, and Advanced Medium Range Air-to-Air Missiles; Army Tactical Missile System; Joint Direct Attack Munitions; and Joint Stand-Off and Sensor-Fused Weapons.

Source: Departments of the Army, Navy and Air Force

DOD faces a major challenge in attempting to pay for all of the programs as planned. To illustrate, annual funding to procure new planned fighter aircraft alone would need to average about $8 billion in real terms at least through 2014. This appears to be unrealistic. The defense budget has been declining in real terms since 1985, and both the administration and the Congress project relatively flat top line defense budgets in real terms over the next 6 years. As the nation attempts to achieve a balanced budget, it may be difficult to increase overall defense spending.

In advising the Secretary of Defense on DOD's plans, the Chairman of the Joint Chiefs of Staff recommended last year that the Secretary increase annual procurement funding to $60 billion by 1998 to better recapitalize U.S. military forces. This compares to the fiscal year 1997 procurement budget request of $39 billion. In making this recommendation, he noted that tactical aircraft procurement plans call for much greater than expected resources in the outyears. The Secretary has said that he will attempt to achieve the needed funding for modernization by seeking higher funding levels from Congress and by achieving savings from outsourcing, acquisition reform, and infrastructure reductions. But, as noted, higher defense budgets appear unlikely, and savings from outsourcing and acquisition reform are uncertain. Moreover, we recently reported that DOD has not yet projected any significant net infrastructure savings through fiscal year 2001.[2]

To put the current funding dilemma into perspective, it should be noted that the current level of investment that DOD plans is more consistent with the former Cold War era than with the current security environment. Based on our analysis of defense spending trends and projections, we have concluded that DOD plans to spend almost as much over the next 18 years to execute its current plans for fighter aircraft as it spent over the last 18 years of the Cold War. One has to ask: With the Cold War ended, should the United

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[2]Defense Infrastructure: Budget Estimates for 1996-2001 Offer Little Savings for Modernization (GAO/NSIAD-96-131, Apr. 1996).

States be spending as much on tactical aircraft over the next 18 years as it did during the massive defense build-up of the early to mid-1980s?

To summarize, DOD has planned investments that are unachievable within likely future budgets and appear to be inconsistent with the current security environment. As I will discuss in the following sections, there are good reasons for DOD to reconsider a number of its planned investments. If it were to modify its current plans, the mismatch between programs and budget could be reduced.

MAJOR AIR POWER INVESTMENT DECISIONS ARE NOT BASED ON JOINT ASSESSMENTS

Our work shows that DOD is proceeding with major air power programs without having sufficiently assessed its joint mission requirements to meet post-Cold War needs. Without such assessments, the Secretary of Defense does not have the information needed to determine the need for and priority of planned investments. In our mission reviews, we found that major force structure and program decisions had been made without completed analyses of the services' joint qualitative and quantitative requirements and aggregate capabilities to conduct these missions. As a result, a definitive answer as to whether planned investments are needed is not clear. However, past GAO work and information developed on our six mission reviews suggest that DOD should reexamine some planned investments for several reasons.

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First, current forces in some mission areas already provide combatant commanders with formidable, often overlapping and redundant capabilities. The total inventory of assets that can be used to interdict enemy ground targets illustrates this condition. As shown by table 2, each of the services have extensive inventories of weapons that can be used for interdiction.

Table 2: DOD's Multiple Assets to Interdict Enemy Ground Targets

Service	Category	Asset	1996 Inventory
Air Force	Fixed-wing aircraft	F-15E	203
		F-16	1450
		F-117	54
		A/OA-10	369
		B-1B	95
		B-2	17
		B-52	66
Navy and Marine Corps	Fixed-wing aircraft	A-6E	63
		AV-8B	184
		F-14A/D	323
		F/A-18	806
	Helicopters	Cobra	176
	Missiles	Tomahawk	2339
Army	Helicopters	Apache	798
		Cobra/Kiowa Warrior	758
	Missiles	ATACMS	1456

Source: Departments of the Army, Navy, and Air Force.

Based on our analysis of DOD's targeting data, the services collectively have at least 10 ways to hit 65 percent of the thousands of expected ground targets in two major regional conflicts. In addition, service interdiction assets can provide 140 to 160 percent coverage for many types of targets. Despite numerous overlapping interdiction capabilities, DOD is investing about $200 billion to provide new and enhanced interdiction capabilities over the next 15 to 20 years. This figure excludes the Joint Strike Fighter program, which will further enhance these capabilities.

Second, we believe that programs initiated in response to Cold War threats should not proceed without being reexamined in light of the changed security environment. For example, the Air Force initiated the F-22 program in 1981 to meet the projected Soviet threat of the mid-1990s. Under this program, the Air Force would acquire 438 new F-22 air superiority fighter aircraft. Now, instead of confronting thousands of modern Soviet fighters, U.S. air forces are likely to confront potential adversaries having few fighters that could successfully challenge the F-15--the U.S. frontline fighter. Similarly, the Air Force procured B-1B bombers during the 1980s to acquire long-range, nuclear-capable aircraft as quickly as possible. With the Cold War requirement for nuclear-capable bombers reduced, DOD now plans to spend $2.5 billion to modify its fleet of 95 B-1B bombers to deliver conventional weapons. This investment is being made despite the already substantial capability

to destroy ground targets through other means. The annual operation and support cost of the B-1B fleet is $920 million.

Third, there appear to be less costly alternatives to some highly expensive modernization programs. For these expensive programs, the payoff in terms of added mission capability--considering the investment required--does not appear to be "clear and substantial" as mandated by the National Military Strategy. For example, the Navy F/A-18E/F's expected range, carrier recovery payload, and survivability--key areas that DOD cited in justifying the F/A-18E/F--will be only marginally improved over that of the less costly F/A-18C/D model. Cost estimates for these planes vary widely depending on what costs are included. However, we have recently reported that, based on the Marine Corps' decision not to purchase the F/A-18E/F, the unit recurring flyaway cost of this aircraft could rise to as much as $53 million. This compares to an estimated unit cost of $28 million for the F/A-18C/D, which has been improved in capability.

Less costly alternatives to the Army's Comanche helicopter also appear to exist. According to Army program officials, the total estimated program cost of the Comanche program is about $45 billion. Yet three existing helicopters--the Marines' Super Cobra and the Army's Longbow Apache and Kiowa Warrior already perform many of the functions that would be assigned to the Comanche. The Super Cobra can already fulfill armed reconnaissance and attack

missions, and planned enhancements will increase its speed and rate of climb. The Longbow Apache performs many of the missions intended for the Comanche. Many users believe the lethality, low observability, deployability, and speed of the Kiowa Warrior when combined with certain upgrades or doctrinal changes would resolve many of the deficiencies the Comanche is expected to resolve.

In short, a definitive answer as to the necessity of planned investments is not possible without knowing how aggregate service capabilities match up against joint warfighting requirements. However, based on our work, we believe that DOD's planned investments may be adding little military capability in some mission areas and, in fact, may not be warranted by the current and projected security environment. The extremely high cost of air power investments makes it important for DOD to reexamine each program in relation to joint requirements and existing capabilities and within the context of the post-Cold War environment.

DECISIONS ON AIR POWER PROGRAMS AND PRIORITIES REQUIRE COMPREHENSIVE JOINT ASSESSMENTS

Through key legislation, Congress has sought to better integrate the military services, provide a channel for independent military advice to the Secretary of Defense, and strengthen the joint orientation of the Department. Although DOD has improved its joint orientation in many respects, the services continue to heavily influence defense decisions, particularly those related to investments in weapons. Military advice from a joint perspective

is important to help the Secretary objectively weigh the merits not only of combat air power but also of other defense programs.

The Goldwater-Nichols Department of Defense Reorganization Act of 1986 made the Chairman, JCS responsible for providing military advice from a joint perspective to the Secretary of Defense. As principal military adviser to the Secretary, the Chairman, JCS is expected to advise the Secretary on the requirements, programs, and budgets of the military services. The Act directs the Chairman to (1) provide advice on the priorities of requirements identified by the regional commanders (CINCs), (2) determine the extent to which service program recommendations and budget proposals conform with the CINCs' priorities, (3) submit alternative program recommendations and budget proposals within projected resource levels to achieve greater conformance with these priorities, and (4) assess the military requirements for defense acquisition programs. The National Defense Authorization Acts for Fiscal Years 1993 and 1996 further directed the Chairman, JCS to examine how DOD might eliminate or reduce duplicative capabilities and authorized him, through the Joint Requirements Oversight Council, to assess military needs from a joint warfighting military perspective.

Although progress is being made, we believe that the Chairman, JCS needs to do more to effectively carry out these responsibilities. For example, DOD established a joint warfighting capabilities assessment process, under which assessment teams are examining

issues related to ten selected mission areas. Established in 1994 to support the Joint Requirements Oversight Council, these assessment teams have identified ways to improve joint warfighting and have proposed other operational improvements. However, the teams so far have had little impact in reducing unneeded overlaps and duplication in existing capabilities. Also, they have not been directed to delve into more controversial issues related to U.S. air power, such as assessing alternative ways to modernize U.S. air power capabilities.

The Department must conduct broader, more comprehensive assessments if the Secretary is to have the information he needs to make the difficult tradeoff decisions that may be required. At a minimum, we believe that such assessments should, for each mission area,

-- assess total joint warfighting requirements;

-- inventory aggregate service capabilities, including the full range of available assets;

-- compare aggregate capabilities to joint requirements to identify excesses or deficiencies, taking into consideration existing U.S. capabilities and those of potential adversaries;

-- assess the relative merits of retiring alternative assets, reducing procurement quantities, or canceling acquisition

programs where excesses exist or where substantial payoff is not clear; and

-- determine the most cost-effective means to satisfy deficiencies.

Conducting assessments in this way could help the Secretary of Defense better decide what priority should be given to competing programs, whether programmed investments should continue to be funded, and whether new investments should be made.

CONCLUSIONS

In conclusion, I would underscore that we believe that it is important that DOD make air power investments that are matched to identified needs. Funds spent on programs that add little needed capability at very high cost when existing capabilities may already be sufficient to meet future challenges are, in our opinion, funds not well spent.

To be in a position to make sound investment decisions, DOD needs to closely examine both its combat air power force structure and its modernization plans, which are rooted in the Cold War era. The high cost of modernizing the force requires that DOD seek the greatest value in its investments given current budget projections. Overlapping and often redundant air power capabilities provide combatant commanders with desirable operational flexibility to

respond to a wide variety of circumstances. The question is whether, in the post-Cold War era, the United States needs, or can afford, the current levels of overlap and redundancy.

The Secretary needs better information from a joint perspective to help decide what priority should be given to competing programs, whether programmed investments should continue to be funded, and whether new investments should be made. The urgent need for such assessments is underscored by the reality that enormous outlays will be required in the not-too-distant future to finance DOD's combat air power programs as currently planned.

Our work has led us to conclude that the Secretary of Defense needs broader more comprehensive assessments in key mission areas if he is to make the difficult decisions that he is likely to face. However, certain long-standing obstacles must be overcome if the key challenges related to air power are to be met head on. The Chairman, JCS must be a strong advocate for the joint perspective as the Goldwater-Nichols legislation intended. The interests of the U.S. military as a whole must be placed above the interests of the individual services. And, if circumstances change and program adjustments are needed, the Secretary and the Chairman, JCS must be willing to challenge the strong proponents that develop around major acquisition programs. If DOD is to shape its force smartly within the bounds of likely budgets, existing levels of redundancy

in capability must be questioned, and no program, once begun, should be considered irreversible.

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Mr. Chairman, this concludes my prepared statement. I would be happy to address any questions you or other members of the subcommittees may have.

DRAFT

SELECTED GAO REPORTS RELATED TO THIS TESTIMONY

Navy Aviation: F/A-18E/F Will Provide Marginal Operational Improvement at High Cost (GAO/NSIAD-96-98, June 1996).

Combat Air Power: Assessment of Joint Close Support Requirements and Capabilities Is Needed (GAO/NSIAD-96-45, June 1996).

Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 1996).

Combat Air Power: Funding Priority for Suppression of Enemy Air Defenses May Be Too Low (GAO/NSIAD-96-128, Apr. 1996).

Navy Aviation: AV-8B Harrier Remanufacture Strategy Is Not the Most Cost-Effective Option (GAO/NSIAD-96-49, Feb. 1996).

Aircraft Requirements: Air Force and Navy Need to Establish Realistic Criteria for Backup Aircraft (GAO/NSIAD-95-180, Sept. 1995).

B-2 Bomber: Status of Cost, Development, and Production (GAO/NSIAD-95-164, Aug. 1995).

Longbow Apache Helicopter: System Procurement Issues Need to be Resolved (GAO/NSIAD-95-159, Aug. 1995).

Weapons Acquisition: Precision Guided Munitions in Inventory, Production, and Development (GAO/NSIAD-95-95, June 1995).

Comanche Helicopter: Testing Needs to Be Completed Prior to Production Decisions (GAO/NSIAD-95-112, May 1995).

Tactical Aircraft: Concurrency in Development and Production of F-22 Aircraft Should Be Reduced (GAO/NSIAD-95-59, Apr. 1995).

Cruise Missiles: Proven Capability Should Affect Aircraft and Force Structure Requirements (GAO/NSIAD-95-116, Apr. 1995).

Army Aviation: Modernization Strategy Needs to Be Reassessed (GAO/NSIAD-95-9, Nov. 1994).

Tactical Aircraft: F-15 Replacement Is Premature as Currently Planned (GAO/NSIAD-94-118, Mar. 1994).

Strategic Bomber: Issues Relating to the B-1B's Availability to Perform Conventional Missions (GAO/NSIAD-94-81, Jan. 1994).

(701096)

Mr. WELDON. Thank you, Mr. Davis. We appreciate your error. And Mr. Rodrigues, we welcome you here and thank you. Do you have anything you would like to add?

Mr. RODRIGUES. No, not at this time, Mr. Chairman; thank you.

Mr. WELDON. Thank you all, and thank you all for being here. At this point in time, we would like to ask you all to move back, if you could, and we welcome our other two distinguished witnesses, Dr. Paul Kaminski, Under Secretary of Defense for Acquisition of Technology from DOD and Gen. Joe Ralston, Vice-Chairman of the Joint Chiefs of Staff and chairman of the Joint Requirements Oversight Council, two very distinguished men who have appeared here a number of times. We welcome you both here this afternoon.

Following the testimony of Dr. Kaminski and General Ralston, we will bring back Dr. Williams and Mr. Davis, and we will then allow members to ask questions. Welcome. Dr. Kaminski, the floor is yours for as much time as you need.

Mr. KAMINSKI. We have a joint statement to put into the record, and with your permission, I would like to ask General Ralston to begin.

STATEMENT OF GEN. JOE RALSTON, VICE CHAIRMAN, JOINT CHIEFS OF STAFF AND CHAIRMAN, JOINT REQUIREMENTS OVERSIGHT COUNCIL

General RALSTON. Mr. Chairman, members of the committee, I would like to begin today by taking a few moments to express the sympathy of the Department to the families of those servicemembers who lost their lives or were injured in the Dhahran bombing. This senseless act of terrorism is a tragic reminder of the danger that our men and women in uniform face every day as they perform the mission our country asks of them. The loss of 19 and the injury of scores of others is a personal sorrow for all of us, and we are grateful for the support of the Congress and the American people during this tragedy.

Mr. Chairman, thank you for the opportunity to appear today to discuss our plans for one of the Department's most important priorities, and that is the modernization of U.S. tactical aviation forces. With your strong support and direction, we have worked diligently to field forces capable of deterring conflict by demonstrating to any potential enemy that U.S. forces will have air dominance. If that deterrence fails, we will have the capability to protect our forces from air attack at the start of hostilities, and within hours, we will be on a path that will end the conflict decisively.

We had air dominance in Desert Storm. The first U.S. Air Force combat aircraft from the First Tactical Fighter Wing at Langley, 24 F–15C's, arrived in Dhahran, Saudi Arabia on August 8, 1990. That was 34 hours after receiving the deployment order, and they were on combat alert patrol 4 hours later. Within days, the U.S. Air Force force structure in Southwest Asia included three squadrons of air-to-air superiority fighters and eight squadrons of air-to-ground fighters. Before the end of August, the U.S. Marine Corps had over 100 fixed-wing aircraft as well as 90 helicopters. These numbers increased during the next several weeks as additional attack aircraft, OB–10's and helicopters arrived in theater, and that included 20 AV–8B's embarked aboard amphibious ships. Two car-

rier battle groups with more than 100 fighter and attack aircraft and more than 10 surface combatant ships were directed to sail to the gulf region. Ultimately, the total naval forces deployed consisted of six aircraft carrier battle groups, and during phase one deployments, the United States deployed about 1,000 aircraft.

We heard a lot about the 4-day ground war in Desert Storm, but do you also know about the 40-day air war, a withering attack by air power of all four services? Within a few days, we had shut down the Iraqi Air Force and achieved total air dominance. We had it; we liked it; and we want to keep it. So, our program is designed to maintain this air dominance that was achieved 5 years ago.

More importantly, the consequence of having air dominance means that all the other things we are trying to do at sea and on the land are made possible because these operations are not going to be halted by opposing enemy air forces. The Dayton peace accords, in my opinion, would not have occurred without the persuasive influence of U.S. air power: Air Force, Navy, and Marines. We are not looking for an equal or a fair fight. If our deterrence fails, and we must go to war with a future adversary, we want it to be unfair. We want the advantage to be wholly and completely on our side. Air dominance will leverage all of the other operations that we will be conducting. No U.S. soldier has been killed by an enemy aircraft in over 40 years, and we don't intend to relinquish that advantage.

Mr. Chairman, I have a few charts that I would like to walk through with you. I'd like to start off with what we will call the tac air road map, showing that today, we have eight different aircraft in our tactical inventory. The dates I show here are the dates that those airplanes first flew, were first airborne. As you can see, in most cases, it was in the 1970's, the early seventies. There are two exceptions, and those were both in the sixties. So, we have an old force of tactical aviation.

Five years ago, we had a development program and a modernization program to replace each of these eight airplanes with its own development and its own modernization program. The world has changed; we acknowledge that. That was an unaffordable program. This is the program that we have today. We are going from eight different airplanes with eight different development programs to three airplanes: the F–18E/F, the F–22, and the Joint Strike Fighter.

This chart shows what I will call foreign fighters, but there are numerous threats around the world of very modern and capable airplanes: the Mirage 2000; the Su–35; the Gripen; the Rafale; the EF–2000, and other advanced fighters. Notice that these design advances give these fighters superiority over our topline fighters today of the F–15 and the F–18 in terms of acceleration, maneuver, engine thrust, their rates of climb, their avionics, their fire power, their radar signature, and their range. Now, not every one of these is superior to our airplane in every measure, but many of them are superior in many measures. And also, there are substantial airplanes—as you can see, thousands of airplanes—that we may have to fight around the world.

Here is a little time line. It goes back to the sixties, and the blue dots are the airplanes I just talked to you about, our current inven-

tory. And again, this represents their first flight. This is not when the technology was frozen; this is when the airplanes were flying. The technology was frozen years before that. Notice that the rest of the world has been developing airplanes down in this part of the chart, in the late eighties and the nineties, and here is where the F–18, the F–22, and the JSF come along.

I might add that when I was a young captain in 1972, July 1972, I attended the first flight for the F–15. This modern air fighter that we think of as very modern today, that was 24 years ago, and we are still 9 years away from its first combat replacement, the F–22, in the year 2005. The threats that you see here are not just airplane threats, but these are cruise missiles, the MICA advanced air-to-air missile, the AA–12, the SA–10 surface-to-air missile, the SA–12 and the Su–35. I might add that all the systems shown on this chart were advertised for sale anywhere around the world at the Dubai Air Show from last fall.

I call this our old strategy. Five years ago, we had a 1-to-1 replacement strategy. We had single service weapons. The Navy had a missile for Navy airplanes, the Phoenix. The Air Force had missiles for Air Force airplanes. We each had our own versions of air-to-ground bombs and air-to-ground missiles, and our modernization was primarily focused on what I call one-dimensional: It was aerodynamic performance. That gave us a favorable kill ratio as the acceptable standard. I might say that in the cool comfort of a room, it's nice to sit down and go through and analyze, and if you come out with one airplane left when the enemy loses his last one, that's a favorable exchange ration. But more importantly, we're talking about the lives of young American men and women, and that's why we want dominance.

Our new strategy calls for a one-for-many replacement. We have already reduced our tactical air forces by over 40 percent. We are also looking at commonality of weapons. Today, you don't find each service having its own set of weapons. We have commonality. And we are looking at a multidimensional modernization. We are looking at better aerodynamic performance; we're looking for stealth for its offensive first look-first kill. We want to be able to accept the information explosion, take off-board information and get that into the cockpit, and we have got to reduce our support requirements.

Next slide. I have a chart on each of our airplanes here, but on the support requirements, for example, with the changed world, we don't have as many airplanes forward-based as we used to have. That means we have to leave the United States, get wherever the battle is going to be with a small number of forces. Today's F–15 takes at least 17 to 20 C–141's to move a squadron. The F–22 does that in less than half. The F–15 today takes 25 people per airplane which you have to deploy overseas. The F–22 would do that with almost half. The combat sorties between major maintenance, this is like your 1972 television set that you don't have any more where the picture tube always failed. Today, with modern avionics, you get 8.5 sorties between maintenance on an airplane.

The F–18, the characteristics that make it a much better airplane than its F–18C, about a 40-percent increase in range. In terms of payload recovery—and this is to come back aboard the carrier, and you have to have sufficient fuel to get to your alternate

as well as bring your ordnance from the day back aboard. For example, the airplanes flying over Bosnia today on combat air patrol, they need to come back and land with their ordnance if they didn't expend it when they went out there. Today, this is at the margin of safety for the F–18C. The E model gives us almost double the payload recovery.

And in terms of growth, today's F–18C has almost none left. It has less than two-tenths of a cubic foot of volume. The E model has considerable volume as well as the power and the cooling to go with that.

The Joint Strike Fighter, three different competitors, as you see here. But the big advantage is it is common to all three services; it has a common cruise engine in all cases; the airframe is somewhere between 40 and 60 percent common parts; another 10 or 20 percent cousin parts. This is a part, for example, that may be the same, but you drill the holes in a different place on there, and the avionics are greater than 95 percent common.

The last I would like to talk about is affordability. It's easy enough to take a snapshot of where we are today and what is being spent on tac air power and say that is too high a percentage. But I might explain that we make our investments over time in cycles. If you look in the seventies, all of these airplanes, every one of them, was born in the seventies in terms of its research and development and its investment. In the eighties, we didn't do tac air. We did Peacekeeper missiles, small ICBM's, Trident submarines, D–5 submarine-launched ballistic missiles, the advanced cruise missile, the B–1, the B–2. In the nineties, we did mobility. We did fast sealift ships and large-medium RORO's and C–17's and C–130J's. So that by the time we get to the 2000's, it's time to go back and modernize those seventies airplanes that we have.

So, if you took a snapshot in the eighties, you would say my God; we're putting too much money into strategic modernization and not enough into tac air. Or, if you looked in the nineties, you might say we're putting too much into mobility. Or, if you look in the 2000's, you might say it's too much for tac air. But this is a planned modernization that has to go in cycles.

Mr. Chairman, I would like to turn it over to Dr. Kaminski and welcome your questions later.

STATEMENT OF PAUL KAMINSKI, UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY, DEPARTMENT OF DEFENSE

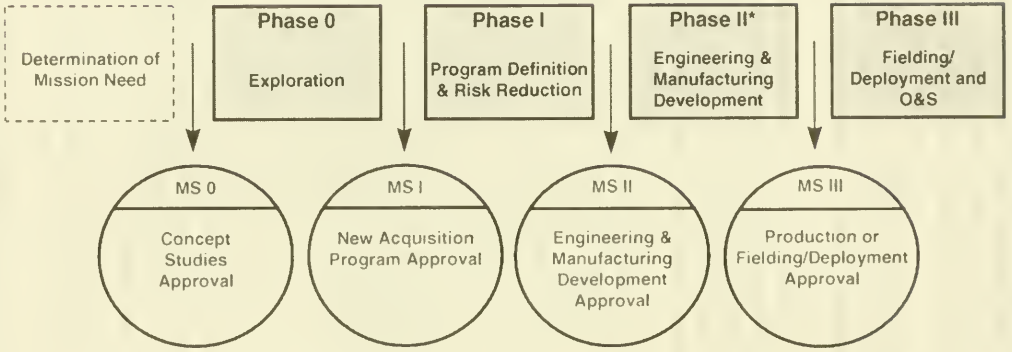
Mr. KAMINSKI. Mr. Chairman, I would just like to use a few charts if I may. I would start off by just briefly describing our defense acquisition process, which I am in charge of. This process typically proceeds in a series of milestones, milestone zero beginning with concept studies and approval, milestone one with new acquisition program.

Mr. STUMP. Doctor, would you pull the microphone just a little closer, please?

Mr. KAMINSKI. Yes.

[The information referred to was submitted for the record:]

Defense Acquisition Process



* May include Low Rate Initial Production (LRIP)

Mr. KAMINSKI. A milestone one, with new acquisition program approval; milestone two, leading into engineering and manufacturing development and tests of the design and then a milestone three, with production and fielding of the equipment. We very recently issued a new set of 5000-series documentation in the Department tailoring this entire acquisition process, providing some freedom to tailor this to the situation, to do what makes sense as opposed to enforce what I would call a one-size-must-fit-all for every program.

So, the idea is to bring some sense and reason as to what to do with various milestones. For example, we have built the freedom into this system to entirely skip the first two milestones for a piece of equipment that is already developed, a piece of commercial, off-the-shelf equipment on which we are simply wasting time and energy in a milestone-one approval when we know what the piece of equipment is. So, we can move that directly to a milestone two.

What I wanted to do now is take this process and describe where we are today with the Joint Strike Fighter Program vis a vis this process. We are sitting today at milestone one. This milestone approval is typically reached before we award our contracts for definition studies. We are at this point today in the Joint Strike Fighter Program. We expect to make our awards for concept definition studies in November of this calendar year, November 1996. Those RFP's are now out on the street; we are in source selection prior to those awards.

[The information referred to was submitted for the record:]

Joint Strike Fighter

Acquisition Documentation and Reporting Plan

Milestone I Requirement	JSF Program Status
Mission Need Statement	**Complete** - Joint Interim Requirements Document (JIRD) signed by Services and reviewed by JROC
Initial Operational Requirements Document	**Complete** - JIRD meets requirement. JORD validated prior to Milestone II
Acquisition Strategy	**In Process** - Briefed to DAB, SAMP approval prior to Concept Demo Phase (CDP) contract award
Acquisition Program Baseline *	**In Process** - Approve SAMP prior to CDP contact award
Cost as an Independent Variable	**In Process** - Approve objectives in SAMP prior to CDP contract award
CDP Phase Exit Criteria	**In Process** - Approve SAMP prior to CDP contract award
Test & Evaluation Master Plan	**In Process** - Approve philosophy in SAMP prior to CDP Contract Award
Cost Estimate	**Complete** - Program Office Estimate (CDP & EMD); LCC & UFC estimates prior to Milestone II
Analysis of Alternatives	**In Process** - Continuous COEA
Initial System Threat Assessment	**In Process** - To be provided by DIA November 96
Selected Acquisition Report (RDT&E)*	**In Process** - To be submitted with President's FY 98 Budget

** Statutory Requirement*

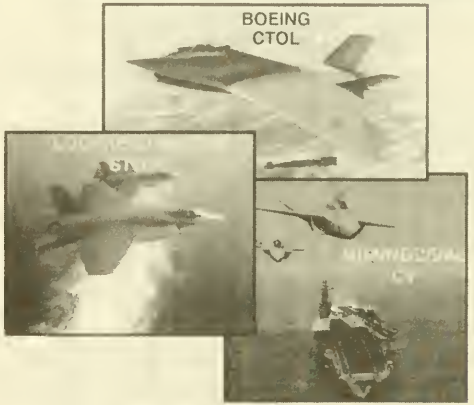
Mr. KAMINSKI. On my next chart, I have compared, Mr. Chairman, what is the typical set of milestone one requirements, that is, what requirements would we have met had we rigidly applied this acquisition program prior to the concept development awards, and where are we with the Joint Strike Fighter Program on the right. At milestone one, we would typically have a mission-needs statement for the JSF; that's complete. We would have an initial operation requirements document. That is it. We have the joint interim requirements document [JIRD]. We expect to continue to refine that requirement under the Joint Requirements Oversight Council [JROC], led by General Ralston, as we proceed to milestone two.

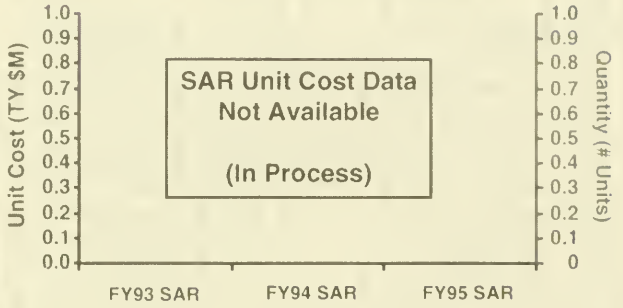
An acquisition strategy; that is in process. It is not complete today, but we expect to have a system acquisition master plan briefed to the Defense Acquisition Board [DAB] prior to our concept demo phase contract awards in November. An acquisition program baseline is also in progress. Our application of costs is an independent variable in which we are trading off the cost of a new system, addressing the very affordability requirements that were described by the prior two witnesses, trading those off against our performance needs and cost-effectiveness models. That is in progress; that will continue through milestone two. The establishment of exit criteria, also in progress, is expected to be done before a CDP award. A cost estimate has now been completed by the program office. It has not been finally reviewed by our independent cost assessment office, our CAIG, but that review is in process.

In our analysis of alternatives, that is something we expect to be continuous in this program, a continuous COEA, as we continue throughout to look at technology finding its way onto the airplane to meet performance requirements. An initial system threat assessment is in process, due to be provided by the Defense Intelligence Agency in November 1996. And finally, a selective acquisition report is in process, expected to be submitted with the President's 1998 budget. That selected acquisition report, incidentally, I have the authority to waive prior to milestone two, and I typically do that, because we don't have a sufficient base to write that report in most situations prior to milestone two. So, I wanted to give you, Mr. Chairman, just an assessment of what is typical in milestone one and where we are with the Joint Strike Fighter Program on the right.

[The information referred to was submitted for the record:]

Joint Strike Fighter





US Navy: First Day of War, Survivable Strike Fighter

US Air Force: Multi-Role Aircraft to Replace F-16

US Marine Corps: STOVL Aircraft to Replace the AV-8B and F/A-18

Mr. KAMINSKI. If I might have the next chart, please, this Joint Strike Fighter Program I think is the very model of the kind of program that we are trying to pursue in the Department. It's a first day of the war survivable strike fighter for the Navy; a multirole aircraft to replace the F–16 for the Air Force and a short take off and landing [STOVL] aircraft to replace the AV–8B and the F–18 for the Marine Corps. This program addresses very many of the points raised by Mr. Davis. This is a joint program, and, in fact, more than that, this also is an allied program. We already have our first ally signed up for participation in the program. We expect this to be expanded in the future.

We are taking a whole different approach on this program. We are looking for joint use not of exactly the same airframe, as we tried to do on the T/F–X. What we are looking at will end up being different airframes but manufactured on the same piece of common, flexible manufacturing equipment and using, to the maximum extent possible, a common set of components in a building block sense: common avionics, common engine, common weapons. That will end up being very important through the life cycle of this airplane, because those are the things that get replaced as aircraft age, and so, we will have economies of scale in that whole family of supporting components.

Also, doing this program in a joint way, we estimate that we will save about 40 percent of the development cost that we would have expended had we gone out and done three different programs through development and flight test. We also estimate very substantial savings in life cycle costs because of this commonality of components that I described: Numbers as high as $60 billion of life cycle cost savings have been estimated using this approach. Now, we are clearly at an early stage, and I can't tell you we have those numbers pinned down with a high degree of certainty, but the promise looks here.

This program has made, in my opinion, the best use of modeling and simulations that we have ever done in the Department as we looked at trading off the various mission requirements and trading those off with cost. We have also given attention to creating both entry and exit ramps for potential international partners on the program, and those discussions are now developing very seriously with the United Kingdom participating today and early discussions having begun with nations who bought the F–16, such as Netherlands and Norway.

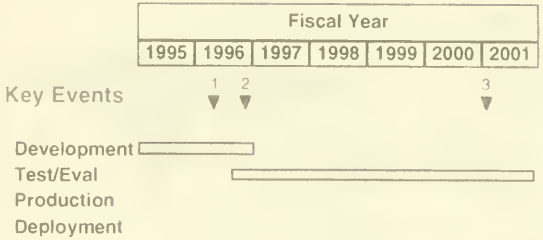
This program also, Mr. Chairman, I think, has had the best linkage that I have ever seen in the Department between the Joint Requirements Oversight Council [JROC] in requirements, between the DAB and between the Defense Resources Board [DRB]. We have had several special meetings on this program to make sure we had each of these elements coupled. For example, a recent meeting just in April of this year with the service Chiefs, with the service Secretaries, with Deputy Secretary White, General Ralston and myself all going through to make sure we had in the budget being put together in the Program Objective Memorandum [POM] the funds necessary for us to proceed with this concept development phase that I described. The kind of review that this program

has had, has not been ordinary; it's been extraordinary; it's been very, very carefully reviewed and surveyed.

[The information referred to was submitted for the record:]

Joint Strike Fighter

Schedule



Program Status

	Key Event	Date
1	Release Concept Demo RFP	03/96
2	Award Concept Demo Contract	11/96
3	DAB MS II	01/01
4	First Operational Aircraft Delivery	06/08

Budget

Then Year $M	Prior	FY96	FY97	FY98	To Complete	Total
RDT&E	211.6	192.1	589.1	876.8	1,431.3	3,300.9
Procurement						TBD
Other (UK Funding)	0	14.0	71.0	55.0	60.0	200.0
Quantity (R&DProc)	Program Quantities Being Defined					

Baseline: FY97 President's Budget

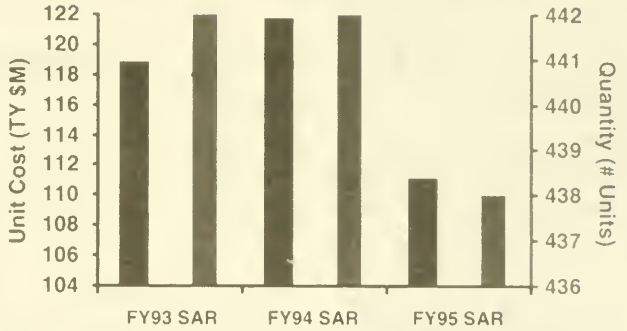
Mr. KAMINSKI. If I might go to the next chart, please, this is the schedule associated with the program. We released the concept demo request for proposals in March of this year. That source selection is currently underway for us to select down from three design teams to two. That will begin the concept demo phase with the award of two concept demonstration contracts. These are very key contracts in my mind, because the proof is in the pudding here. We'll really see how far we can get down this path when we have four flying aircraft in this concept demo phase. That moves from the theory to the demonstration of the practice, and it's very key.

This schedule leads to a DAB milestone two, beginning of engineering and manufacturing development in the year 2001 and the first operational aircraft delivery in June 2008. This schedule is still being refined. As it is indicated today, it is a schedule without concurrency, and I would not be prepared to recommend concurrency in the program until we have a better understanding of the program and its milestones and the ultimate need for end equipment.

What is in the budget today for the concept development phase is $3.3 billion. The procurement program today is not defined. We also have a commitment of funding, as indicated, from the United Kingdom to the tune of $200 million contributing to our joint development program. The United Kingdom's planned interest is in the STOVL version, the version that our Marine Corps has an interest in, for replacement of their AV–8B aircraft.

[The information referred to was submitted for the record:]

F-22



First Look-Shoot-Kill Capability

Superior agility, super-cruise and reduced observability

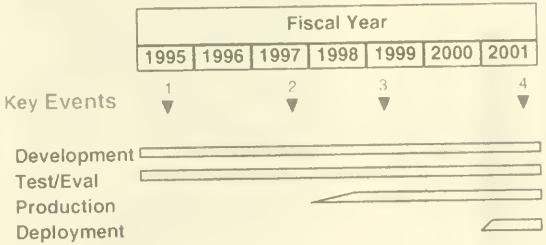
Significantly increased reliability, maintainability, supportability

Mr. KAMINSKI. Next chart, please. The next two charts describe the status of the F–22 Program. General Ralston described very well the capabilities of this aircraft with first look, shoot and kill capability, giving us this air dominance that we need for the future. I have plotted on the right in green the unit cost trace, comparing year-by-year from the 1993, 1994, and 1995 Selective Acquisition Reports [SAR's]. You can see a slightly unfavorable trend to start and a more favorable trend with the 1995 SAR in our estimate of unit cost. The blue bars track the expected quantity to be procured by year; most quantities, I'm sure, will continue to be adjusted as we conduct our various trades through the years.

[The information referred to was submitted for the record:]

F-22

Schedule



Program Status

	Key Event	Date
1	CDR (Air Vehicle)	02/95
2	First Flight	05/97
3	Low Rate Production	02/99
4	Initial Production Delivery	05/01
5	IOC	11/04

Budget

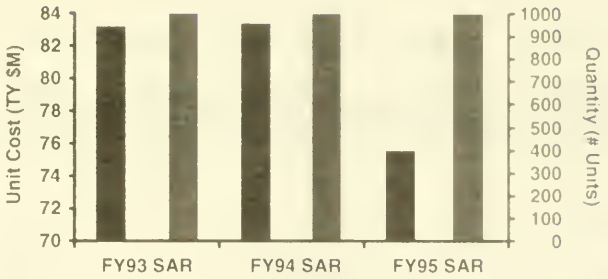
Then Year $M	Prior	FY96	FY97	FY98	To Complete	Total
RDT&E	11,847.6	2,164.9	2,003.0	2,214.5	2,974.7	21,204.7
Procurement				86.8	48,597.6	48,684.4
Quantity (R&D)	0	0	1	2	10	13
Quantity (Proc)	0	0	0	0	438	438

Baseline: FY97 President's Budget

Mr. KAMINSKI. The next chart shows the schedule of the program. We expect first flight milestone two shown on that schedule to occur in May of next year; the beginning of low-rate production in February 1999, with our initial production delivery aircraft in May 2001, and our Initial Operational Capability [IOC] achieved at the end of 2004. The Research, Development, Test and Evaluation Program [RDT&E] for the F–22 is estimated at $21 billion, and the procurement estimate for the quantity of 438 aircraft is estimated to be $48.7 billion.

[The information referred to was submitted for the record:]

F/A-18E/F Super Hornet



Reduced Signature and Improved Survivability

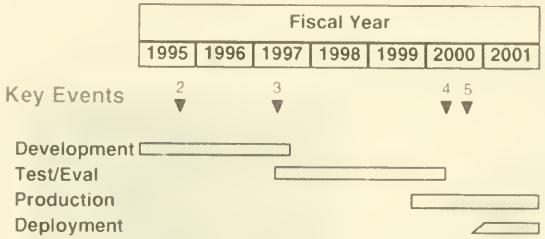
35% Increase in Mission Radius

50% Increase in Endurance

22% Increase in Weapons Capacity

F/A-18E/F Super Hornet

Schedule



Program Status

	Key Event	Date
1	MS IV Approval	05/92
2	First Flight	11/95
3	LRIP (12 Aircraft)	03/97
4	Full Rate Production	03/00
5	IOC	09/00

Budget

Then Year $M	Prior	FY96	FY97	FY98	To Complet	Total
RDT&E	3,845.3	820.4	360.5	157.0	220.3	5,403.5
Procurement		229.7	2,249.1	2,947.3	70,129.2	75,555.3
Quantity (R&D)	10	0	0	0	0	10
Quantity (Proc)	0	0	12	24	964	1,000

Baseline: FY97 President's Budget

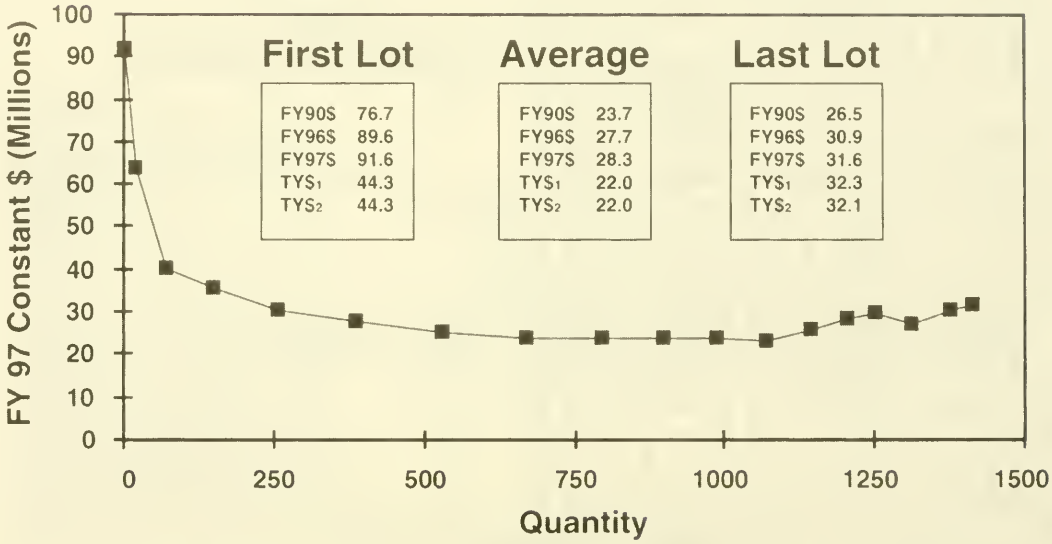
Mr. KAMINSKI. Next chart; same two status charts for the F–18E/F Super Hornet Program, in green again tracking the unit cost estimates on the SAR. Here, you can see the overall trend is favorable and in blue, the quantity, the number of units expected to be procured. I would say from my perspective the main feature that this aircraft offers in addition to those improvements indicated in percentages are the prospects of growth for the future. General Ralston pointed out, I think, very clearly the limited growth capability that we have with the F–18C and D. This platform gives us the ability to grow and improve this aircraft, enhance its performance over the tens of years that we expect it to be in service.

The schedule and program status is shown on the next chart. The RDT&E associated with this program is much smaller than for the F–22. The reason is that this is an upgrade of a current aircraft design. The total requirement is $5.4 billion. Our estimate for the procurement of 1,000 aircraft is $75.5 billion. We had the first flight of the Super Hornet in November of last year. We will begin our low-rate initial production of 12 aircraft in March of next year, and we expect to be at full rate production just at the turn of the century, in March 2000, with our IOC late in the year 2000.

[The information referred to was submitted for the record:]

F/A-18 AB/CD Cost

Unit Recurring Flyaway Costs



TY$1: Then year $ escalated at 1/95 (prior) OMB indices.
TY$2: Then year $ escalated at 2/96 (current) OMB indices.

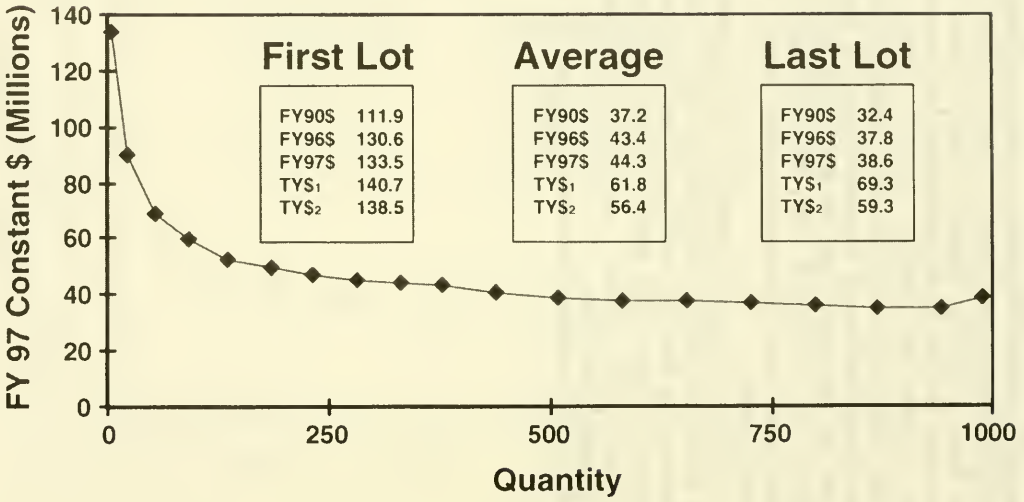
Mr. KAMINSKI. Next chart, please. There have been a lot of different cost comparisons associated with the C/D and E/F Program, and I thought I would illustrate a more apples-to-apples comparison with the following two charts. This first chart shows the learning curve that typically happens with a new aircraft program where the costs for the first production lots are very high until we learn how to build the aircraft, until we ramp up to build it at higher rates. This curve also shows a transition between the A and B and the incorporation of improvements. If you see the wiggles that happen in the curve out to the right at about the number $1,250, those are associated with improvements in capability for the C/D and also some adjustments that happen with variation in unit production cost.

But I would draw to your attention one number here. As we have ended up at the end of our production of C's and D's, if you look at the numbers for last lot, and I will just pick one to make a comparison, take the fiscal year 1997 dollars to give us a common base, in fiscal year 1997 dollars, our unit flyaway costs for the F–18C/D was $31.6 million.

[The information referred to was submitted for the record:]

F/A-18 E/F Cost

Unit Recurring Flyaway Costs



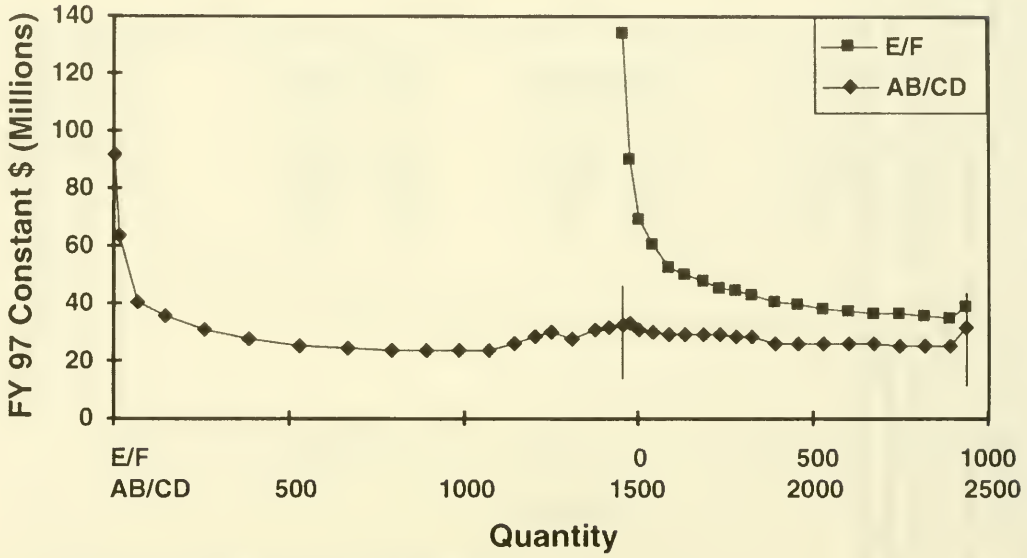
TY$1: Then year $ escalated at 1/95 (prior) OMB indices.
TY$2: Then year $ escalated at 2/96 (current) OMB indices.

Mr. KAMINSKI. If we go to the next chart, let me find the same comparable number for you. For the F–18E/F in 1997 dollars, the unit recurring flyaway cost for the last lot is $38.6 million. Now, that's a difference between the two of about $7 million on a base of about $32 million. So, what we're talking about here is a little less than a 25-percent unit recurring flyaway cost difference after both of these programs have stabilized, and you are buying off a stabilized production run.

[The information referred to was submitted for the record:]

F/A-18 AB/CD vs E/F Cost

Unit Recurring Flyaway Costs



TY$1: Then year $ escalated at 1/95 (prior) OMB indices.
TY$2: Then year $ escalated at 2/96 (current) OMB indices.

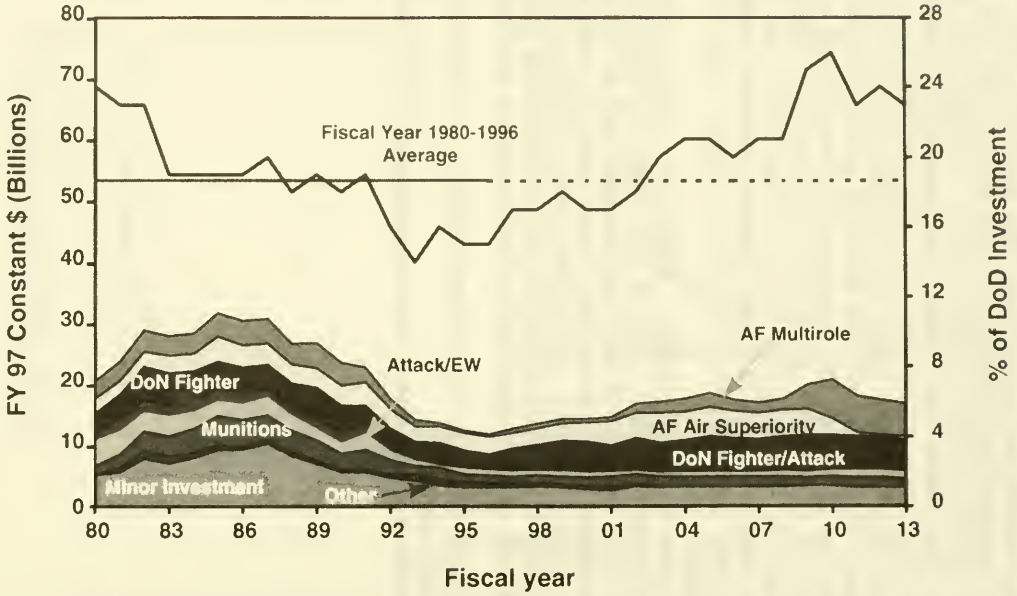
Mr. KAMINSKI. If I may go to the next chart, what I have done is plotted these two curves together. And often, the comparisons that are made between programs like the C/D and the E/F have to do with making comparisons between the red line, where you have already established the learning curve, and the blue line, and you can see that where you make the comparison makes a big difference. There is a premium to be paid for every new program. As these two reach steady state, the additional cost of the E/F, as I illustrated, is a little bit less than 25 percent of the cost of the C/D. But as we start the program, there is a big unit cost difference, and that is the price of a new program. What we get for the price of a new program are two things. One, the enhanced capability, the survivability, the greater mission performance described; and the prospects for growth. That's what this 25 percent is buying us.

But it also is, Mr. Chairman, a little bit of a pay-me-now or pay-me-later aspect of this, also as Mr. Davis mentioned. There are support costs associated with the aircraft, and as the aircraft gets old, the support costs go up. So, there is sort of a tail on the other end if I added to these acquisition costs the support costs. So, to some extent, that increase in support costs offsets part of this tail that we had at the beginning of this program paying for the new design.

If I might have the next chart, I'd like to comment now on the issue of affordability.

[The information referred to was submitted for the record:]

TacAir Investment Funding



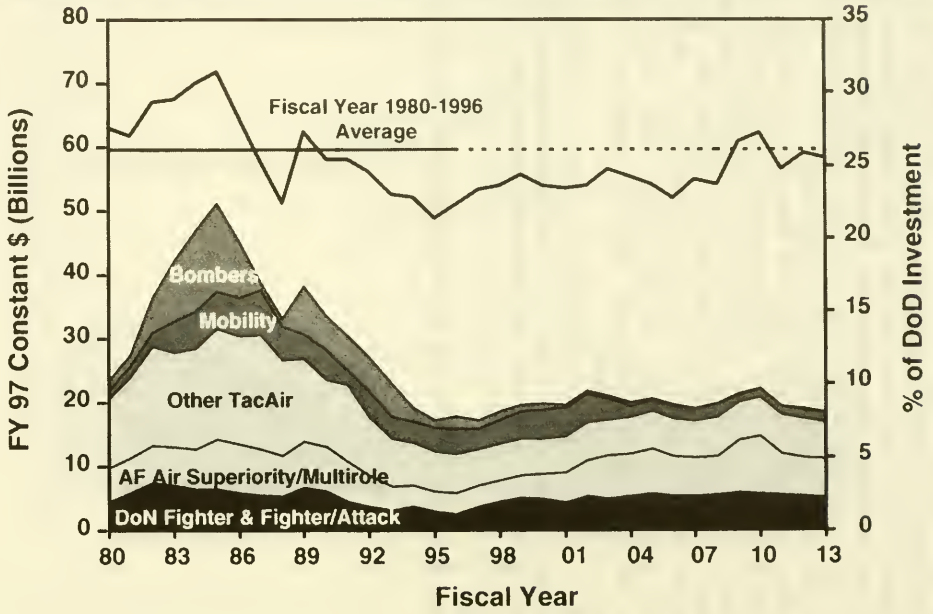
Mr. KAMINSKI. General Ralston, I think, showed quite clearly the fact that we operate in phases with our major programs, and our planning in the Department allows for phase modernization of various components. What this chart shows on the left is our tactical air investment plotted in fiscal year 1997 constant dollars, and you read that in the scale on the left. And what I have aggregated is all of our tactical air programs here: Air Force, Navy, Marine Corps, the related munitions and the related supporting investments in command and control, et cetera.

On the right side of the curve is the percent of the DOD investment budget that this tac air investment represents, and that's the green curve. So, you can see that our historical average here of investment was exceeded in the early 1980's—the green curve is above the red line—and we are expecting also to exceed that historical average as we move to the years 2007 and 2010. And, of course, we underran that level with this pause in modernization that was illustrated in 1995.

Now, I think this growth that's out here in 2007 and 2010 was the concern being expressed by the Congressional Budget Office, the fact that this is above our historical averages. If I might go to the next chart, I think you have to look at this in a broader perspective.

[The information referred to was submitted for the record:]

Aircraft Investment



Mr. KAMINSKI. What I have plotted here now is total aircraft investment for the Department. Besides tac air, I have included our investment for mobility forces and our investment for bombers. And what you can see here is that in the early eighties, we exceeded our average, but even through this program of buildup that we are talking about in the future, we are still very close to our historical average. And the reason for that is that by the time our investment begins kicking in for tactical air, we will have completed our investments in bomber upgrades, and we will have completed our investment in mobility forces, being helped tremendously by the multiyear procurement of the C–17, which was recently approved by the Congress. So, this gives us some wiggle room to be able to make the investments that we need in tactical air as we move to the turn of the century.

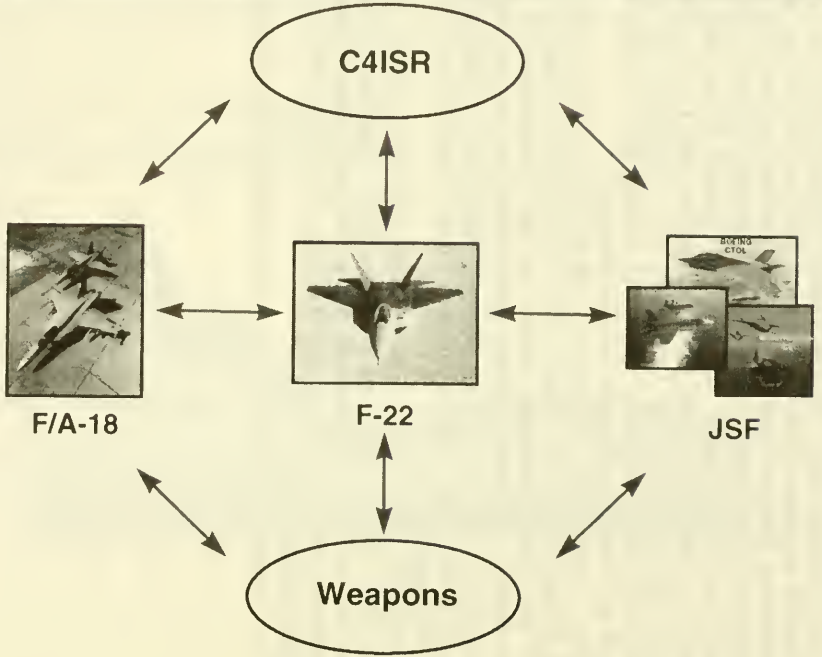
Now, I also have to point out to be clear that the numbers 1996 and going backward, those are actuals. The number starting in 1997 and going forward, those are our predictions. And what we have to do is deliver on those predictions, so we are making projections here, and achieving those predictions is not without challenges. That is something we will have to work very hard to control the affordability of.

I will also say that we have the possibility for some enhancement here with the international cooperative program potentials that have not yet fully developed. They will help share some of the investments in the program to the extent we can bring those about.

Next chart, please.

[The information referred to was submitted for the record:]

Tactical Aviation Trades



Mr. KAMINSKI. We talked about the need for trades and continuing trades. We are in complete agreement, Mr. Chairman, that these trades have to go on. They have to go on in many different dimensions. They have to go on across our various platforms to look at the mix of F–18's, F–22's, Joint Strike Fighters. They have to include the weapons that these platforms carry as well as the weapons carried by other platforms. And they have to include the C–4ISR, our command, control, and intelligence information that's enabling these platforms by providing them with targeting information and the intelligence in the battlefield. All of these factors need to be traded off to make the right investment decisions over the long term.

Some of these trades are not easy to make. Some of these things are very hard to model. We're working hard at doing that. We are far from perfect in many of the areas. Some of the things to be modeled are very difficult to do, but we have upped our efforts to do this very, very substantially.

[The information referred to was submitted for the record:]

Tactical Aviation Program

Summary

Effective Processes and Oversight Exist

Modernization Plans Are Sound

- Solid Acquisition/Business Strategy
- Life Cycle Cost Reduction Emphasized

Platform/Weapons Mix Studies In Progress

Mr. KAMINSKI. In summary, Mr. Chairman, I believe that we have effective processes and oversight in place. We are trying a tailored approach to our acquisition program management using integrated product teams to work with this whole family of programs. We have, in my opinion, on these programs the best linkage between the JROC, the DAB and the DRB that we have on any programs in the Department. I believe our modernization plans are sound. They are based on solid acquisition and business strategies, but they are not without risk, as I described to you. There will be challenges in bringing these programs in at the prices that we are projecting. It will take good management to do so.

Also, we need to be increasing our emphasis not only on the investment costs but on the life cycle costs of these platforms. What we are doing in the Joint Strike Fighter, I think, is paving new grounds, looking at the components and the major subsystems that are going to be replaced over the lifetime. For a typical program like this, more than 50 percent of the costs over the lifetime has to do with the operations and support costs. We in the Department need to be giving that better attention, and we are doing that on this program.

We also have, Mr. Chairman, a platform and weapons mix study in progress, our so-called deep attack weapons mix study [DAWMS], in progress. That is due to be completed by the end of the year. I don't believe that will be the last of the studies. Our studies of affordability and mix will be conducted every year through our Defense Resources Board process, and this is an area that we will continue to trade off.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Kaminski follows:]

Embargoed Until Released by the
House Committee on National Security

Joint Statement of

Dr. Paul G. Kaminski
Under Secretary of Defense for Acquisition and Technology

and

General Joseph W. Ralston, USAF
Vice Chairman of the Joint Chiefs of Staff

Before the
Subcommittee on Research & Development and the
Subcommittee on Procurement
of the
House Committee on National Security

on

The DoD Tactical Aviation Modernization Program

June 27, 1996

Embargoed Until Released by the
House Committee on National Security

Chairman Weldon, Chairman Hunter, members of the subcommittees, thank you for the opportunity to appear today to discuss our plans for one of the Department's most important priorities—modernization of US tactical aviation forces. With your strong support and direction, we have worked diligently to field forces capable of deterring conflict by demonstrating to any potential enemy that US Forces will have air dominance. If that deterrence fails we will have the capability to protect our forces from air attack at the start of hostilities. And within hours we will be on a path that will end the conflict decisively. Some will say in today's world air power is not important--that the threat does not warrant our investment. But aircraft exist today that can challenge U.S. aircraft. For example, the SU-27 Flanker and MIG-29 Fulcrum have superior aerodynamic qualities and propulsion systems. Aircraft in development, such as the RAFALE, EF-2000, and SU-35 project increased potential to challenge U.S. aircraft. As you recall, we used to talk about the requirement for air superiority and spoke in terms of kill ratios--accepting U.S. losses to kill enemy forces. Now what we want is not air superiority, but air dominance. The Dayton peace accords would not have occurred without the persuasive influence of U.S. air power--Air Force, Navy, and Marines.

We had air dominance in Desert Storm. The first USAF combat aircraft from the 1st Tactical Fighter Wing at Langley AFB--twenty-four F-15Cs arrived in Dhahran Saudi Arabia on 8 August--34 hours after receiving the deployment order, and were on combat air patrol alert four hours later. Within days the USAF force structure in

Southwest Asia included three squadrons of air-to-air superiority fighters and eight squadrons of air-to-ground fighters. Before the end of August, the USMC had deployed 48 F/A-18s, 40 AV-8Bs, 10 A-6Es, 12 EA-6Bs, and six KC-130s, as well as 90 helicopters. These numbers increased during the next several weeks as additional attack aircraft, OV-10s and helicopters arrived in theater, to include 20 AV-8Bs embarked aboard amphibious ships. Two carrier battle groups with more than 100 fighter and attack aircraft and more than 10 surface combatant ships were directed to sail to the Gulf region on 2 August. Ultimately, the total naval forces deployed consisted of six Aircraft Carrier Battle Groups (CVBGs). During Phase I deployments, the United States deployed about 1,000 aircraft.

Up until the first day of the war, the Iraqi Air Force was generating up to 40 sorties a day. Within a few days, we shut down the Iraqi Air Force and achieved total air dominance. We had it, we liked it, and we want to keep it. And so our program is designed to maintain this air dominance that was achieved five years ago. More importantly, the consequence of having air dominance means that all the other things we are trying to do—at sea and on the land—are made possible because these operations are not going to be halted by opposing enemy air forces.

We are not looking for an equal or fair fight. If our deterrence fails and we must go to war with a future adversary, we want it to be unfair—we want the advantage to be wholly and completely on our side. Air dominance will leverage all the other operations we will be conducting. No U.S. soldier has been killed by an enemy aircraft in over 40 years--and we don't intend to relinquish that advantage.

Analytical Framework

Our TACAIR modernization plan flows from years of analysis, thought, and intensive debate. The analytical framework that supports this plan is both complex and rigorous. Each of the Services evaluate current and projected capabilities in the context of changing threats, policy guidance, and military strategy to identify deficiencies. Cost

and performance trades are addressed to preserve an acceptable balance between risk and affordability. The Joint Requirements Oversight Council (JROC) has a role in shaping military requirements within the Department of Defense. These remarks will provide some background on the JROC itself, address its corresponding focus and processes and attempt to answer your specific questions on TACAIR.

JROC OVERVIEW

In 1994, General Shalikashvili directed the Vice Chairman to expand the charter of the Joint Requirements Oversight Council (JROC) to more fully support him in addressing his statutory responsibilities. The JROC correspondingly established its attendant Joint Warfighting Capability Assessment (JWCA) process, including greatly increased involvement by the Combatant Commanders and the Services. We believe that this process, now concluding its second year, has been successful in supporting the CJCS's military advice to the SECDEF.

Joint Warfare Capability Assessment Process

The JWCA process examines key relationships and interactions among warfighting capabilities to identify opportunities for improving joint effectiveness. Each JWCA team is composed of warfighting and functional area experts from the Joint Staff, Unified Commands, Services, OSD, Defense agencies, and others as required to conduct continuous assessments within their respective domains, as directed by the JROC. The JWCA teams assess areas with capability deficiencies, unnecessary duplication, or exploitable technologies; as well as areas where we may prudently accept some risk. TACAIR recapitalization is one of the areas in which the JWCA process is heavily involved.

The resulting JWCA findings and recommendations are presented to the JROC for its consideration. Against this context, a goal of the JWCA process is to bring

knowledge to the "four-star" military forum. The JROC is therefore instrumental in helping the Chairman explore alternatives through more extensive, open, and candid assessments of joint military capabilities and requirements by the Unified Commands, Services, and Joint Staff.

Requirements Process

The initial steps in approving and initiating aircraft development programs are the Service-developed Mission Area Analysis (MAA) and Mission Need Statement (MNS). MAA is an on-going activity for identifying deficiencies in existing warfighting capabilities or determining more effective means of performing assigned tasks within assigned mission areas. The analysis considers alternatives to new systems development. When no other alternative is available and a deficiency may lead to a major defense acquisition program, a MNS is developed. The MNS will identify and describe the mission deficiency; discuss the results of mission area analysis; describe why non-materiel changes (i.e., doctrine, tactics, training) are not adequate to correct the deficiency; identify possible materiel alternatives; and describe any key boundary conditions and operational environments that may impact satisfying the mission need.

For major acquisition programs, the Joint Requirements Oversight Council (JROC), in consultation with the Services and Combatant Commanders, review and validate the MNS. Additionally, the JROC validates a proposed systems Key Performance Parameters (KPPs) focusing on only the most essential to meet the mission need. These are forwarded to the Defense Acquisition Executive for inclusion in the Acquisition Program Baseline which contains other important cost, schedule, and performance parameters. The VCJCS is the Chairman of the JROC and Vice Chairman of the DAB which creates the critical linkage between the requirements process and the acquisition process and ensures continuous monitoring and highlighting of Service and Combatant Commanders inputs.

Collectively and individually, the JROC assesses the Services' needs for tactical aircraft requirements. The following provides an overview of recent JROC assessment of individual aircraft acquisition programs.

F-22 Requirements

The JROC initially reviewed the F-22 program in 1991. At that time, the JROC validated the mission need and confirmed that the KPPs provided the capability to satisfy the mission need. The F-22 will replace the F-15 aircraft in the Air Superiority role to counter emerging threats worldwide. It will dominate the future air combat arena - flying over fifty percent more sorties, with forty per cent fewer personnel, and using fifty per cent less airlift than the F-15. The F-22 is designed to penetrate enemy airspace and achieve first look-shoot-kill capability through stealth, supercruise, and integrated avionics. The F-22 is the first weapon system designed from the outset with its principal focus on exploiting the ongoing information revolution while simultaneously denying an enemy the ability to do the same. While integrated avionics allow for dominant battlespace awareness, stealth denies crucial information to the enemy. Supercruise increases weapon performance, while reducing the enemy's ability to make effective use of the small amount of information they can gather.

F/A-18E/F Requirements

The JROC initially reviewed the F/A-18E/F program in January 1992. At that time, the JROC validated the mission need and confirmed that the KPPs provided the capability to satisfy the mission need. The F/A-18E/F, operating with other Navy battlegroup assets, will provide a survivable, first-day of the war strike fighter capability that will meet the threat well into the first part of the 21st century. The F/A-18E/F is less expensive to develop than a new start program because it is an upgrade to the existing F/A-18 aircraft program. The F/A-18E/F is a multi-mission tactical aircraft

designed to replace the F/A-18C/D, A-6, and F-14 aircraft as they reach the end of service life and retire. The F/A-18E/F is designed primarily to meet Navy fighter escort, interdiction, fleet air defense, and close air support requirements. Enhancements will include the increased range, increased carrier recovery payload, improved survivability, and system growth (volume, electrical, cooling) required for the F/A-18E/F to meet its strike fighter role.

When the JROC initially reviewed the F/A-18E/F program it included Marine Corps requirements. Recently, the Marine Corps indicated they do not intend to continue in the F/A-18E/F program. The Marine Corps has a standing requirement for a Short Take-off Vertical Landing (STOVL) Strike Fighter (SSF). In the early 1990s; the Marines were faced with the need to plan for replacing their F/A-18C/Ds and AV-8Bs in the outyears. The options were an SSF which could result from the Defense Advanced Research Projects Agency (DARPA) ASTOVL demonstration effort, or a combination of F/A-18E/Fs and either new or remanufactured AV-8Bs. At that same time, given the expectation that the DARPA ASTOVL effort would not lead to a viable SSF until the 2015 time frame, the USMC anticipated that the F/A-18E/F might constitute the only viable bridge to the SSF, and made the decision to join the F/A-18E/F program and remanufacture AV-8Bs to keep them operational.

By 1994, the JAST program became a reality and the possibility of acquiring a SSF significantly earlier than 2015 began to look promising. In 1995, the ASTOVL effort, under Congressional direction, was merged into the JAST program. It became apparent that an operational ASTOVL aircraft could become a reality in the 2008 timeframe. Procurement of the F/A-18E/F as a bridge to SSF would not be necessary because, existing F/A-18C/D and remanufactured AV-8Bs would allow the Marine Corps to bridge the gap until the STOVL variant of Joint Strike Fighter (JSF) becomes operational. The Marine Corps believes their current plan to maintain F/A-18C/Ds and remanufacture AV-8Bs will meet their operational needs and will avoid significant modernization cost for DOD.

The JROC has initiated a special study to address this issue, and other related tactical aircraft issues. The plan is to develop recommendations that will be reviewed by the JROC, Service Chiefs, and CINCs in preparation for the F/A-18E/F production decision in the February 1997 timeframe.

Joint Strike Fighter Requirements

The JROC initially reviewed the JSF program in August 1995. At that time the JROC validated the Services' needs. Present Service plans call for the JSF to replace the F-16 and A-10 in the Air Force, replace the AV-8B and F-18 in the Marine Corps, and provide the Navy with a highly survivable first day strike aircraft to complement the F/A-18E/F. Because these earlier aircraft were bought at high annual rates during the 1970s, high JSF production levels will be needed to preclude a precipitous decline in tactical aviation forces for all the Services around 2005.

The 1993 Bottom Up Review (BUR) determined that a separate tactical aviation modernization programs by each Service was not affordable and canceled the Multi-Role Fighter (MRF) and Advanced Strike Aircraft (A/F-X) program. Acknowledging the need for the capability these canceled programs were to provide, the BUR initiated the Joint Advanced Strike Technology (JAST) effort to create the building blocks for affordable development of the next generation strike weapons system

The JSF program has emerged from the JAST effort. As a multi-mission sortie generator for the Air Force, JSF will replace the F-16 as it reaches the end of its service life beginning around FY 2005. The cancellation of the A-12 in 1991 left the Navy with the unfulfilled requirement for first-day-survivable, stand-alone, long range strike capability. The JSF will satisfy that requirement and complement the F/A-18E/F. The Marine Corps has a long standing requirement to replace their TACAIR forces with a common aircraft that goes where Marines go, that is responsive to the ground commander, and light enough to operate from forward bases or amphibious ships. The

JSF will meet Marine Corps needs as existing aircraft reach the end of their service life. The JSF program provides an affordable answer to multi-service requirements.

The first formal product of the JSF requirements definition process was the Joint Initial Requirements Document (JIRD) signed in August 1995 by all of the participating Services. The JWCAs reviewed the current TACAIR strategy, to include the JSF. Results were briefed to the JROC, the Joint Chiefs, and each of the CINCs. The conclusion of that extensive review resulted in JROC support for the current TACAIR strategy to include the direction and scope of the JSF program. The process recognized the potential for achieving an affordable solution to meet our joint warfighting needs.

In addition to individual aircraft acquisition programs, the JROC looks at the potential to integrate air-to-air and air-to-ground weapons on these platforms to ensure joint warfighting requirements are being met.

PRECISION GUIDED MUNITIONS

Precision Guided Munitions (PGMs) are an indispensable part of our Services TACAIR program and numerous steps are taken to avoid duplication and redundancies in PGM procurement. While drafting a MNS, the lead Service considers the potential for integrating a particular PGM on multiple platforms within that Service. As the JROC coordinates the MNS, other Services and the CINCs consider whether a particular PGM would suit their existing or projected needs and may recommend integrating that PGM on other platforms.

Following MNS validation, the Services consider the integration of a particular PGM on multiple platforms. This determination is made during ORD development. The ORD may stipulate commonality issues to ensure that the PGM is not platform-specific. Joint procurement programs would have a ORD that contain multiple Service platform requirements. The Joint Air-to-Surface Standoff Missile (JASSM) program is an example of JROC oversight regarding PGM cost-performance trades and interoperability concerns.

Joint Air-to-Surface Standoff Missile

In August 1995, the JROC reviewed the JASSM MNS, validated the mission need, and determined affordability should be a major consideration. JROC concerns regarding affordability were provided to the DAB with a recommendation to focus efforts during the initial development phase of JASSM to minimize procurement and life cycle costs. In June 1996, the JROC again reviewed the JASSM program. The Services had embraced the concept of affordability and specified affordability guidelines within the operational requirements document. Also, the JROC observed that the Navy had included JASSM integration on the F/A-18E/F as a goal vice a requirement. In keeping with its interoperability of munitions policy, the JROC directed the ORD be modified to include the integration of the JASSM on the F/A-18E/F as a mandated requirement vice an optional goal. The Navy will revise their budget to reflect this change in program status. This ongoing oversight process, led by the JROC, with participation from the services, CINCs and JWCAs continues to produce positive results within the requirements arena.

As a result of JROC Oversight, future PGM acquisition programs, particularly those PGMs delivered by fixed-wing tactical aircraft, will be joint and interoperable. The Navy and the Air Force have jointly procured PGMs and are participating in joint development programs, including the Joint Direct Attack Munition (JDAM) and the Joint Stand-Off Weapon (JSOW). These jointly developed PGMs will be carried on multiple platforms in both Services. For example, JDAM will be carried by the Air Force's B-52, B-2, B- 1, F- 15, F- 16, F-22, and F-117, and the Navy's F/A-18, F-14, and AV-8B. Likewise, JSOW will be carried by the Air Force's B-1, B-52, F-15, and F-16, and the Navy's F/A-18 and A V-8B. Additionally, individual Services have procured PGMs developed by the other Services. For example, the Navy and Marines purchased variants of the Air Force-developed Maverick and the laser-guided bombs. The Air Force bought the Navy-developed High-Speed Anti-Radiation Missile (HARM). One

Air Force developed laser-guided bomb (GBU-10) is carried by six Air Force platforms and four Navy platforms, while the Navy developed HARM has been carried by two Navy platforms and two Air Force platforms. The goal is to integrate weapons on multiple platforms consistent with budgetary constraints and aircraft availability.

REQUIREMENTS SUMMARY

The JROC, through the JWCA process, special studies, and other ongoing assessments, directs numerous efforts which provide oversight to the requirements process. The JROC specifically focuses on affordability and cost-performance tradeoffs. The goal is the ferreting out of duplication, unnecessary redundancies, or inflated performance requirements, while ensuring this Nation maintains the capability for air dominance into the 21st Century.

DAB OVERVIEW

Chairman Weldon, Chairman Hunter, members of the subcommittees, some of your questions were directed at the Department's processes for ensuring that planned acquisition programs are executed within requested budgets. The Defense Acquisition Board (DAB) is the senior advisory group within the Department chartered (DoD 5000.2-R, Part 5.2) to oversee the DoD acquisition system. The present DAB evolved from its predecessor, the Joint Management Review Board (JMRB) and its predecessor, the Defense Systems Acquisition Review Council which was instituted by David Packard in 1972.

The DAB is currently composed of the USD(A&T) (Chair), the Vice Chairman of the Joint Chiefs of Staff (Vice Chair), the Principal Deputy USD(A&T), the Under Secretary of Defense (Comptroller), the Assistant Secretary of Defense (Strategy and Requirements), the Director of Operational Test and Evaluation, the Director of Program Analysis and Evaluation, the Service Acquisition Executives, the Director of

Defense Research and Engineering, the chair of the cognizant DAB Overarching Integrated Product Team (as appropriate, the Director of Strategic and Tactical Systems; the Deputy Under Secretary of Defense for Space; or the Deputy Assistant Secretary of Defense for Command, Control, Communications, and Intelligence Acquisition), the cognizant Program Executive Officer(s) and Program Manager(s), and the DAB Executive Secretary. The DAB Chairman is also routinely supported by senior staff advisors.

The DAB is responsible for advising the Defense Acquisition Executive (DAE) on the enforcement of policies and procedures governing the operations of the DoD acquisition system. This group reviews mission area deficiency needs validated by the Joint Requirements Oversight Council for the Milestone 0 decision to start a new acquisition program and possible concept exploration study efforts. A key function of the DAB is to perform reviews of the Department's major defense acquisition programs (MDAPs) at the Milestone I through Milestone III decision points. The DAB ensures that established DoD acquisition policy and program requirements are met before permission is given to proceed into the more advanced stages of development or production.

The MDAP programs are directed, funded efforts designed to provide a new or improved materiel capability in response to a validated mission area deficiency. Programs estimated to reach and exceed total expenditure thresholds of more than $355 million for research, development, test, and evaluation (RDT&E) or more than $2.135 billion in procurement in fiscal year 1996 constant dollars are designated as MDAPs. In addition, the Defense Acquisition Executive has the authority to designate any acquisition program as an MDAP.

ACQUISITION OVERSIGHT

We would like to describe in general terms the process used to oversee the acquisition system—policies, processes and programs. We believe the Department of

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Defense has the necessary oversight mechanisms in place to ensure a critical and independent review of all defense acquisition programs.

For major defense acquisition programs, the purpose of a DAB review is to give the Component Acquisition Executive, Program Executive Officer, Program Manager, and other senior officials management guidance and/or permission to proceed. There are two types of DAB reviews. The first type of review, a DAB Milestone Review, requires specific completed documentation and validation for the program to proceed. These requirements, actions, and responsibilities are defined in DoDD 5000.1 and DoD 5000.2-R. The second type of review, a DAB Program Review, can occur at anytime in the program's progression. A program review can be triggered for a host of reasons, including an Acquisition Program Baseline (APB) breach, a testing failure, a funding shortfall, or a change in mission requirements. The cognizant DAB Overarching Integrated Product Team (OIPT) leader is responsible for the DAB review agenda, presenting an overview of the program, summarizing the results from the overarching integrated team review, defining the issues, and offering acquisition decision memorandum recommendations.

The DoD 5000-series acquisition policy directives require certain supporting activities take place prior to a DAB milestone review (Milestones I through III). An appropriate series of Integrated Product Team (IPT) meetings are conducted to identify issues and define review requirements for the upcoming decision point. Next, a review by the OIPT is conducted and all issues and alternatives are clarified. A DAB Readiness Meeting (DRM) is held about one week following the OIPT review. The purpose of this meeting is to provide the cognizant OIPT leader with an opportunity to present the views and findings of the OIPT to the USD(A&T) and VCJCS. The USD(A&T), in turn, may give further guidance to the cognizant OIPT leader in preparation for the upcoming DAB review.

The DAB meeting is usually scheduled one week after the DRM. Two days following the DAB meeting, the USD(A&T) signs an Acquisition Decision Memorandum (ADM) to the appropriate Component Acquisition Executive that

contains guidance, direction, and approvals. Documentation requirements for non-milestone DAB program reviews are based on the issues to be addressed. For this type of review, documentation requirements do not exceed what is normally required for a milestone review. A similar set of oversight and review processes exist in each of the Services and acquisition components for non-major defense programs.

In addition, there are independent processes and checks and balances in place to assess threats, requirements, cost estimates and cost-operational effectiveness analyses. The Intelligence Community independently validates the threat in a System Threat Assessment Report (STAR) for each program before the appropriate DAB Milestone Review. The JROC oversees the requirements generation process and mission need determination to ensure that it is linked to our military strategy. The OSD Cost Analysis Improvement Group (CAIG) performs an independent cost estimate (ICE). The Director of Program Analysis and Evaluation conducts an independent assessment of the Analysis of Alternatives (AOAs) performed by the Services, and also assesses the affordability of the service programs annually through the Program Review Process. Independent oversight is one of the key elements in the Department's acquisition oversight process.

The Department's key decision-making bodies, the Defense Acquisition Board and Defense Resources Board, combine membership from both the acquisition and requirements communities to ensure a critical review from all perspectives is accomplished. This is an institutionalized, well-structured process.

ACTDs

Advanced Concept Technology Demonstrations (ACTDs) are a pre-acquisition activity designed to determine if the selected programs have sufficient military utility to justify transition into acquisition. The oversight of ACTDs contains three main elements. First, the selection/approval process includes reviews by the senior technical representatives from the services and OSD from technology maturity and program

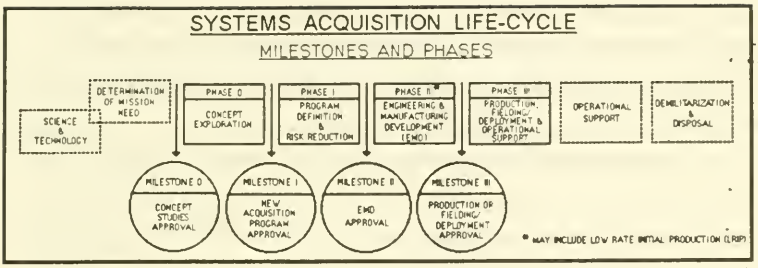
viability perspectives and to ensure no unnecessary duplication. The candidates that pass that review are then reviewed and prioritized by the JROC with final approval by the USD(A&T).

Second, a management plan is prepared for each ACTD, defining technical and programmatic aspects of the program. This plan is approved by the Deputy Under Secretary of Defense for Advanced Technology, the Commander of the sponsoring operational user organization, the Acquisition Executives of the executing service or director of the executing agency, and senior representatives of all key participants. An Oversight Group that includes senior representatives of each of the same organizations, holds a semi-annual review to assess progress.

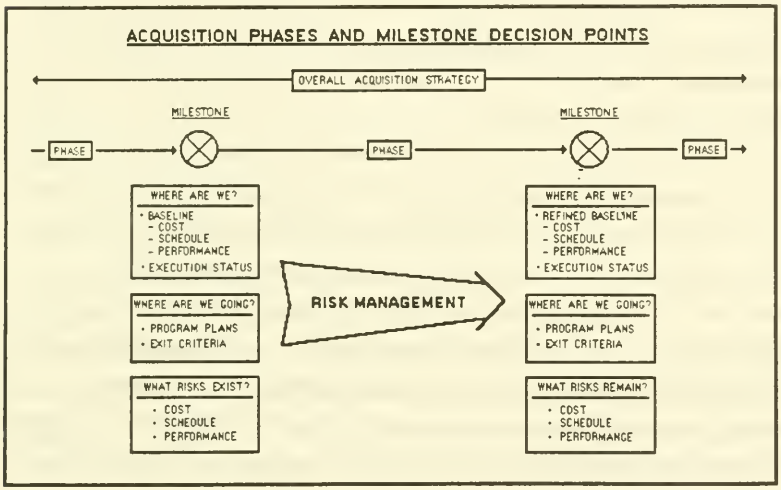
Third, the strategy for transition of an ACTD into acquisition is developed early in the ACTD, addressing such things as; procurement strategy, operational testing, life cycle costing, and supportability. A Transition Integrated Product Team is created at that time to review the strategy and to oversee the preparations for transition. Entry into acquisition occurs only if justified by the demonstrated military utility, in which case a formal program review is conducted to confirm readiness to transition. Entry into the acquisition process would typically occur either at the start of EMD or Low Rate Initial Production, depending on maturity of the design.

ACQUISITION PROCESS

The key features and characteristics of the defense acquisition process are the customary milestones and program phases. The Milestone Decision Authority (MDA) can tailor these milestones and phases based on a program's size, risk, or complexity. The four major milestone decision points and four phases, illustrated on the next page, typically provide a basis for comprehensive management and progressive decision making.



Phases and milestone decision points facilitate the orderly translation of broadly stated mission needs into system-specific performance requirements and a stable design that can be produced efficiently. Low Rate Initial Production (LRIP) may occur during Phase II if so decided at Milestone II (see DoD 5000.2R part 1.4.4.1).



As shown above, assessments are made of program execution status and plans for the next phase and the remainder of the program at each milestone decision point.

The risks associated with the program and the adequacy of risk management planning are explicitly addressed. Additionally, the milestone decision authority approves program-specific results to be achieved prior to entering the next phase, called exit criteria.

The milestone decision authority also ensures that contracts are structured so that milestone decisions are made well before expenditure of funds on activities in subsequent phases. Contract options and phases are structured so that information on exit criteria completion is provided in time to support the acquisition review. The objective is to provide proper fiscal controls without delaying the acquisition decisions or contracting actions.

The plan for executing an acquisition program—the approach used to design, develop, and deploy a system through its life cycle—is the acquisition strategy. It is prepared by the program manager and submitted to the Milestone Decision Authority for approval early in the program. The acquisition strategy documents the program manager's approach for minimizing the time and cost of satisfying an identified, validated need. It evolves through an iterative process and becomes increasingly more definitive as the program proceeds.

Depending on the selected acquisition strategy, combined or repeated milestone decision points and associated activities within the acquisition phase may be required. For example, in an evolutionary acquisition strategy, there may be multiple decision points, depending on the amount of functionality provided in each increment. In coordination with the Integrated Product Team members, the program manager may propose delegation of the incremental decision points. A second example is the use of Commercial-Off-The-Shelf (COTS) or Non-Developmental Item (NDI) products, requiring no custom changes, which may result in the consolidation of the acquisition "Program Definition and Risk Reduction" and the "Engineering and Manufacturing Development" phases. In that case, a Milestone II may not be required. Similar tailoring may be applicable to migration systems.

The DAB reviews the execution status of al major defense acquisition programs in each mission area. Collectively and individually, the DAB assesses the Department's progress in implementing acquisition reforms and commercial buying practices. The following five sections provide an overview of selected individual TACAIR aircraft and weapons programs.

F-22 Program

The F-22's low-observable characteristics, supersonic cruise speed, maneuverability, and advanced avionics will guarantee its effectiveness in the air superiority role. It will be capable of conducting air-to-ground operations, carrying two JDAMs internally with a future growth capability for external carriage of air-to-ground weapons. The first engineering and manufacturing development (E&MD) aircraft is scheduled to fly in May 1997. Tests of a full-scale pole model will begin this fall to confirm the aircraft's low-observable signature qualities; software development and integration are continuing as well. Plans call for production deliveries of the first four of a planned total buy of 438 aircraft to begin in fiscal year 2001, with initial operational capability slated for fiscal year 2005.

The F-22 entered E&MD in 1991. The E&MD program consists of all required design activity needed to field the F-22 weapon system. This includes design, fabrication, and development testing of 13 flight test vehicles; design, fabrication, and development testing of 39 E&MD flight qualified engines; update of the Demonstration/Validation Avionics Flying Laboratory into a Flying Test Bed for use in developing and integrating the E&MD avionics suite (including the electronic warfare systems); and the design and development of the F-22 support and training systems. From the outset, the F-22 program has placed balanced emphasis on performance, survivability, reliability/maintainability, and affordability. The aircraft is meeting or exceeding all performance requirements. The first flight is scheduled for May 1997.

Release of long lead production funding for the first production lot of four aircraft is scheduled for fiscal year 1998.

F-22 affordability initiatives date back to the initial acquisition strategy of the Advanced Tactical Fighter (ATF). During the Demonstration/Validation phase of the ATF program, the Air Force implemented many of the 1986 Packard Commission recommendations. Those initiatives included streamlining of the acquisition organization and procedures; the use of technology to reduce cost, which included a competitive prototyping strategy and early operational testing; and the balancing of cost and performance through early trade-offs on user requirements. This approach defined an executable, affordable program before committing to the increased costs associated with Engineering and Manufacturing Development.

When the F-22 successfully transitioned into Engineering and Manufacturing Development, the use of Integrated Product Teams was a centerpiece of the acquisition strategy. This approach employs multi-functional government-industry teams, all working towards a design that properly balances cost, schedule and performance. The IPT approach has been shown to result in less redesign, scrap and rework than the traditional serial development process. The product is an affordable, highly effective and properly time phased weapon system.

Recent program efforts have continued to focus on streamlining to ensure affordability. Required military specifications and standards for the air vehicle pre-production verification (PPV) contract have been reduced by 85 percent and by 88 percent on the engine PPV contract. Contract data deliverables are expected to be reduced from 262 on the original E&MD air vehicle contract to 20 on the PPV and production contracts. Statement of work directions have been reduced from 147 pages for the original E&MD contract to less than 20 pages for follow on production. Program Office manning is projected to be reduced from the current 350 people to 191 in the year 2000.

The F-22 Program from its inception has led the way in implementing Lean Enterprise initiatives, beginning in E&MD and flowing forward into the production

phase. The goal is to reduce costs, reduce delivery timelines, and improve quality in all areas. These initiatives will lead the way in reducing unnecessary oversight. These Lean Enterprise initiatives are geared towards reducing cycle times by 40 percent on the air vehicle and 60 percent on the engine. Other affordability initiatives include reducing security compartmented areas, migrating the advanced integrated avionics toward greater levels of open systems architecture, establishing a "factory to depot" support concept, using a common integrated Logistic Support Analysis database, using proven commercial practices whenever practical, and using commercial off-the-shelf software alternatives.

F/A-18 E/F

In 1987, the Secretary of Defense directed the Department of the Navy and Department of the Air Force to investigate derivatives of existing aircraft to maintain force structure in tactical aviation. Numerous studies conducted by the Navy looked at the future of naval aviation, projected hostile threats, and the capabilities required to defeat those threats. Multi-mission capability in the aircraft of the future was a requirement which would help the Navy consolidate to a fewer number of more capable aircraft types onboard the aircraft carrier.

Those cost and operational effectiveness studies determined that an upgraded version of an existing airframe, either the F-14 Tomcat or F/A-18 Hornet, could meet the requirements. In 1991, an upgraded version of the F/A-18 Hornet was selected as the preferred solution. Secretary of Defense Cheney stated at the time that "the modernization of naval aviation must be bounded by affordability. In selecting the F/A-18E/F we considered not only performance and unit price, but also a host of other factors which impact on cost. In the final analysis, the F/A-18E/F was the clear choice." The F/A-18E/F Super Hornet was developed to provide increased range, increased payload recovery, increased payload flexibility, improved survivability, and renewed (15 plus years) growth potential.

During January of 1992, the JROC initially reviewed the F/A-18E/F program and recognized the Department of the Navy (DON) need to replace F/A-18C/D aircraft in a ground attack role. Increased survivability, mission radius, endurance, and weapon capacity were key elements to be addressed. At that time the Navy F/A-18E/F program included Marine Corps requirements. The JROC endorsed the need to pursue the F/A-18E/F development program and recommended to the DAB entry into the formal acquisition process at Milestone II.

The first E&MD model of the F/A-18 E/F made its initial flight on November 29, 1995. Three flight test aircraft were delivered to Patuxent River Naval Air Station on or ahead of schedule and are fully engaged in the flight test regime. To date, those three aircraft have completed over 100 test flights and flown over 168 hours. Over 84 percent through its engineering and manufacturing development phase, the E/F program is on cost, on schedule and 900 pounds below its weight specification. Furthermore, the aircraft is meeting or exceeding all of its requirements.

The $4.9 billion (base year 1990 dollars) F/A-18E/F E&MD effort will end in fiscal year 2000, and procurement of the first 12 aircraft will begin in fiscal year 1997. Initial operational capability is planned for fiscal year 2001. Recent modernization decisions will allow F/A-18 E/F production to reach the planned maximum rate one year earlier than previously anticipated.

The Navy evolved its plans for the future of its aviation forces based on a number of factors, among them the end of the Cold War and restricted procurement budgets. As a result, the F/A-18E/F has emerged as its principal tactical aircraft. By 2010 the carrier air wing will be composed of the F/A-18C and the F/A-18E/F. For future battle commanders, the F/A-18 E/F will provide such operational benefits as 80 percent more time on station, 35 percent more range, 52 percent more target coverage, 80 percent greater standoff for the battle group or 65 percent more penetration compared to the combat proven F/A-18 C. After 2010, the F/A-18E/F will be complemented by one squadron of Joint Strike Fighters in each carrier air wing.

On March 7th of this year, the F/A-18 Navy Industry Team was presented the first Department of Defense Excellence in Acquisition Award "in recognition of acquisition excellence and superior performance in the engineering and manufacturing development phase of the Navy's F/A-18E/F." The award also noted its successful first flight, and the fact that it was one month ahead of schedule, on cost, and met or exceeded performance requirements.

A primary focus for the F/A-18E/F E&MD program has been cost management and affordability. The program's survivability approach reflects a balance—reduced radar cross section, improved countermeasures, and reduced vulnerable area—for an 87 percent increase in survivability over the F/A-18C/D as demonstrated in analyses of future scenarios conducted for the A/F-X COEA.

During the design phase, manufacturing personnel were teamed with design engineers to form Integrated Product Teams (IPT) to ensure the parts can be easily manufactured. Advanced manufacturing techniques such as high speed machining enabled large parts to be milled from a single billet or forging versus sheet metal build-up. As a result, parts, weight, and assembly hours have all been dramatically reduced. While the F/A-18E/F is 25 percent larger than the F/A-18C/D, it has 42 percent fewer parts.

The Navy and contractor have also formed an integrated flight test team composed of contractor and government test pilots, engineers, and technicians. Previously, the contractor would perform the development and initial testing and then turn it over to the Navy for validation. The Navy and its contractors are going through development and testing together, as a team. Three Navy and two contractor test pilots are flying the test aircraft at Patuxent River Naval Air Station. This integrated approach will decrease the testing time from four years to three years—a savings of time and money.

With the F/A-18E/F, the Navy is developing—at one-half to one-third the cost of a "start from scratch" program—a highly capable, carrier based tactical aircraft for the twenty-first century. The F/A-18E/F program satisfies the Navy's need for a longer

range, more capable, more survivable strike fighter with growth capability to fill its flight decks well into the next century.

Joint Strike Fighter Program

The Joint Strike Fighter (JSF) Program is a product of the Bottom Up Review. In an effort to achieve an affordable long-term tactical aviation modernization plan, the Multirole Fighter and A/F-X Programs were canceled and the JSF Program, formerly the Joint Advanced Strike Technology (JAST) Program, was initiated. The Joint Strike Fighter's "common family of aircraft" approach is a new way of doing business to satisfy the strike warfare requirements of the Navy, Air Force and Marine Corps more affordably. The JSF concept is nothing like the approach taken on the former F-111 program in the late 1960s. Advances in the technology, design tools and manufacturing processes have significantly changed the manner in which aircraft are designed and built. Rather than force fitting a common aircraft design to the different requirements of three Services, the JSF concept is using these advances in technology to build three highly common aircraft variants on a common production line.

The focus of the JSF Program is on affordability—reducing development, production and ownership cost. The program is accomplishing this by facilitating the Services' development of fully validated, affordable operational requirements, and lowering risk by investing in and demonstrating key leveraging technologies and operational concepts prior to the start of Engineering and Manufacturing Development (E&MD).

The "family of aircraft" concept allows a high degree of commonality, while satisfying unique service needs. JSF Concept Exploration Phase results underscored the possibility and benefit of commonality as a viable means of achieving a cost effective solution to maintaining the nation's combat superiority. Concept Development Phase efforts ratified the conclusion of the program's competing weapon system contractors

that a family of aircraft can meet tri-service needs, with overall significant life cycle cost savings.

The JSF concept that has emerged from a continuing set of analyses will share an airframe substantially common among all users. It will have a single engine, based on analysis of the costs and benefits of 1- versus 2-engine propulsion. These studies showed that a single engine, if sufficiently powerful, could meet operational needs if it had an adequately reliable set of auxiliary equipment. The engine selected will be a derivative of an engine of the size developed for the F-22. The Marine Corps version will be capable of STOVL operations. Although this capability imposes special needs, the competing contractor teams have proposed satisfactory approaches that retain substantial commonality with the other two variants.

The JSF will be designed to carry two guided bombs and two medium-range air-to-air missiles internally (plus other weapons on wing-mounted stations when appropriate). Determination that the basic aircraft should have internal, rather than external, weapons carriage, was a key aspect of initial aircraft sizing. Extensive requirements analysis, using the department's standard aircraft survivability models, led to a determination that future surface-to-air threats demanded comparatively low aircraft signature in initial wartime operations.

Although expected to be primarily a one-seat aircraft, some two-seat variants may be developed. Avionics are being defined now, and are expected to draw from work done for the F-22 and other programs. The program office has designed an increasingly detailed series of analyses in coming years to resolve the remaining questions concerning detail design and equipment configuration.

As a result of these studies, the JSF is expected to be considerably more capable than the Air Force F-16 and Marine Corps AV-8B. On the other hand, the JSF will be capable of meeting the Navy's needs at a much more affordable cost than previously planned successor systems, such as the now-canceled A-12 and A/F-X programs.

The JSF approach brings with it the potential cost benefits of a common Depot, commonly supported logistics trail, and increased joint service interoperability. The

cost savings benefit of the tri-service JSF Program compared to separate Service stand-alone programs is significant—nearly $16 billion in development costs alone. . . .

The JSF Program Office and the services are taking a realistic approach to commonality, by recognizing the need for intelligent compromises in establishment of requirements. The Services are working together on a realistic set of joint requirements. The contractors are conducting extensive studies to determine the appropriate level of commonality, and to identify areas where it makes sense to sacrifice commonality to meet unique Service needs. The truly joint structure of the JSF Program ensures balanced input from the three participating Services and a path to definition and achievement of affordable requirements.

Fiscal Year 1995 legislation merged the Defense Advanced Research Projects Agency (DARPA) Advanced Short Take-off and Vertical Landing (ASTOVL) program with the JSF Program. This action drew the United Kingdom (UK) Royal Navy into the program, extending a collaboration begun under the DARPA ASTOVL program. The UK is committing $200 million to the Concept Demonstration Phase of the JSF program in accordance with the terms of a Memorandum of Understanding (MOU) signed in December 1995. Numerous other countries have expressed strong interest in the program, and increased foreign participation with financial contributions is highly likely.

The JSF has now been designated a Major Defense Acquisition Program and is entering its concept demonstration phase, in which full scale concept demonstration aircraft will be fabricated and flown to demonstrate the feasibility of tri-service commonality and reduce technical risk prior to commencement of E&MD in fiscal year 2001. Initial production of the JSF aircraft is anticipated in fiscal year 2005, with first deliveries to operational units in fiscal year 2008.

Present Department plans call for the JSF to replace the F-16 in the Air Force, replace the AV-8B and F/A-18 A/C/Ds for the Marine Corps, and provide the Navy with a highly survivable first day strike aircraft to complement the F/A-18E/F. For the UK Royal Navy, the JSF will replace their Sea Harriers. Because these earlier aircraft

were built at comparatively high annual rates during the 1980s (up to 180 F-16s and 84 F/A-18s yearly, for example), JSF production levels of well over 150 aircraft per year will be needed in spite of the significant reductions that have been made in the aviation force structure in recent years. Without a major acquisition effort, there will be a precipitous decline in the tactical aviation forces of all the Services around fiscal year 2005.

This program is forging a new approach to weapon systems acquisition in order to reap affordability payoffs. In designing the program, the Department applied the recommendations voiced by the Packard and Carnegie Commissions and other experts on Acquisition Reform. This program is not business as usual—it is different in fundamental ways.

Program Integrated Product Teams of warfighters and technologists are using a disciplined strategy-to-task-to-technology process supported by an extensive underpinning of Modeling, Simulation and Analysis to facilitate requirements definition by the services. This process permits development of affordable requirements with maximum focus on jointness. The JSF Program has run three Major Regional Contingency campaign level simulations. Over 90 representatives from government and industry participated in each of these exercises.

The JSF Program is conducting numerous Technology Maturation efforts in leveraging areas to reduce risk prior to entering E&MD to lower the life cycle cost. Demonstration results are made available to all industry participants. Achievement of affordability objectives for the prime contractors' preferred weapon system concepts depends on availability of these technologies. Examples of successful demonstrations to date include carrier suitability of tailless configurations; advanced 1000 pound class penetration warhead; virtual manufacturing validated by an F-15 real-world application; and demonstrations of shared apertures, Virtual Avionics Prototypes, and software common applications. Other demonstrations will quantify weight and cost savings. These include integrated aircraft subsystems; low-cost multi-function array; and innovations in structural materials, design and manufacturing processes. Two

contractors will demonstrate commonality and modularity, STOVL hover and transition, and low speed handling qualities for a multi-service family of strike aircraft in the concept demonstration phase.

In the past, meeting the threat dictated an emphasis on performance, creating a culture in which cost and schedule were thought of as dependent variables in the acquisition process—performance levels were specified and the cost and schedule were adjusted to achieve that outcome. The JSF Program is employing the Cost-As-an-Independent-Variable (CAIV) approach to facilitate the establishment of an affordable, mission effective solution to the Services' needs. CAIV will address the links and sensitivities between mission effectiveness, system performance, and cost. The Services established top-level, aggressive unit flyaway goals, and the program provided them to the competing weapon systems contractors. During the upcoming Concept Demonstration Phase, program contractors will be required to continue to use costs (unit flyaway, Engineering and Manufacturing Development, and Operations and Support costs) as independent variables for trade studies.

The JSF Program continues its role as a leader in the area of DoD acquisition streamlining and reform and use of "paperless" processes. It encourages the use of commercial standards and best practices in weapon systems development; teaming with industry to create a common cost model to improve government and industry understanding of weapon system life cycle cost; and will minimize the number of contractor deliverables through on-line access to the contractors' management systems. The program continues to emphasize electronic processes as the standard means of communication. It has an extensive database which exploits the INTERNET for efficient, real-time dissemination of program information including information related to program procurement solicitations.

Now let us specifically address DoD oversight of the JSF Program. With the JSF recently designated as a Major Defense Acquisition Program, the DoD will begin providing internal and external reports, tailored in accordance with the acquisition streamlining concepts inherent in the new DoD regulations, just as the F/A-18E/F and

F-22 Programs have been doing. The Department will specifically provide an RDT&E Selective Acquisition Report for the JSF Program to support the President's fiscal year 1998 Budget.

Although not previously designated as a Major Acquisition Program, oversight of the JSF program has not been lacking. The first formal product of the requirements definition process was the Joint Initial Requirements Document (JIRD), signed by all of the participating Services and briefed to the Joint Requirements Oversight Council (JROC) late last summer. The JROC endorsed the JSF process and "family of aircraft" strategy and emphasized the "the great potential towards achieving an affordable solution to meet our joint warfighting capability." Completion of the Services' Joint Operational Requirements Document (JORD) is anticipated in fiscal year 1999.

The JAST/JSF program has undergone intense scrutiny within the Department. In the past year alone, the key principals from the Defense Acquisition Board (DAB) have conducted three major reviews of the program. In late August 1995, the USD(A&T), along with several DAB members reviewed the program and each of the contractor concepts, to include critical technologies and risk reduction plans. As a result of that review, the DAB members concluded that the "tri-service family of aircraft" approach was feasible. In preparation for Concept Demonstration Phase (CDP) draft request for proposal (RFP) release, a DAB review of the JSF demonstration program strategy and funding was held. The plan was approved and, after the Deputy Secretary of Defense was briefed, the draft RFP was released. Prior to the formal RFP release in March 1996, a DAB- review was again conducted of the acquisition plan to include CDP objectives, critical technologies, and risk reduction plans. This April, the DoD completed an additional review of the proposed funding for the Engineering and Manufacturing Development (E&MD) phase of the program. This review involved the DAB principals, supported by the Cost Analysis Improvement Group (CAIG). Another review by the Deputy Secretary of Defense followed. This resulted in revised guidance to the Services on funding for the JSF program.

The JSF Program is facilitating the Services' definition of their joint requirements, based on threat data supplied by the intelligence community. A "Continuous Cost and Operational Effectiveness Analysis (COEA)" will support this process. A series of interim COEAs will document key supporting analyses and rationale of weapon systems requirements and resulting attributes of the JSF that are addressed in the JIRD updates. An independent agency will prepare an Analysis of Alternatives (AOA) for Milestone II, conducting cost-benefit analyses of alternative aircraft programs and alternative JSF design features. The OSD Program Analysis & Evaluation office is designing this AOA now and will oversee its accomplishment. The AOA will draw on the extensive analytical work done by the JSF program office but develop independently several alternative approaches that would be available to the DAB at Milestone II to test the superiority of the proposed approach. The DAB and its supporting staff will thoroughly review all program documentation before progressing to the E&MD Phase of the program.

As we prepare to meet the technological, fiscal and threat demands of the next century, the Department of Defense clearly recognizes that we must optimize our tactical air modernization, jointness and commonality to meet our affordability objectives . The Joint Strike Fighter will contribute to this goal.

JASSM Program

Upon termination of the Tri-Service Standoff Attack Missile program, the Air Force and the Navy continued to emphasize the need for a standoff weapon to attack high priority targets from outside the ranges of enemy area air defenses. The operational need is to provide both fighters and bombers the capability to strike heavily defended, high value targets in any campaign. The Joint Requirements Oversight Council (JROC) validated the JASSM Mission Need Statement August 1995. The JASSM Cost and Operational Effectiveness Analysis supported the Service approved

Operational Requirements Document (ORD) in March 1996, and the JROC validated the JASSM Key Performance Parameters in June 1996.

The JASSM is an autonomous precision strike weapon that will attack both fixed and relocatable targets. Target types range from non-hardened above ground to hardened shallow buried, point targets. This joint program will design, develop, integrate, test, and produce missiles for launch from the B-52H, B-1B, B-2, F-15E, F-16C/D, F-117 and F/A-18C/D/E/F. The B-52H, F-16C/D (Block 50), and F/A-18E/F are the threshold platforms for JASSM. The JASSM will be integrated with the remainder of the objective aircraft as priority and funding availability dictate. Integration on the Joint Strike Fighter will be evaluated as it matures.

The JASSM was approved for entry into the Program Definition and Risk Reduction (PDRR) phase in June 1996. The approved Acquisition Strategy includes award of two contracts for the 24 month PDRR phase and down selection to one contractor to complete development in the Engineering and Manufacturing Development phase. The Required Assets Available date is third quarter fiscal year 2001. Requests for Proposal (RFPs) were issued in March 1996 and the source selection culminated in the selection of Lockheed-Martin Integrated Systems and McDonnell Douglas Aerospace for the competitive PDRR phase.

The JASSM program incorporated a number of new acquisition techniques in addition to implementing many of the latest initiatives proposed by other programs. These initiatives accelerated the preparation for award process to approximately 9 1/2 months. The JASSM RFP and requirements were developed using streamlined processes. Both documents were developed in an unprecedented partnership with industry, the joint warfighters, and the Department of Defense acquisition community. The draft RFP was available on an electronic bulletin board throughout the development process. This allowed quick turn around (30 days) on the proposals. All competitors were provided the source selection standards as part of the RFP. The entire proposal was limited to 320 pages plus a 5 hour video tape presentation for the

technical description. These factors allowed the source selection to be accomplished in under 45 days.

The ORD includes a central theme of affordability. The JASSM acquisition approach is based on precepts of Acquisition Reform and the concept of Cost as an Independent Variable (CAIV). JASSM is one of the flagship programs for CAIV implementation. Instead of mandating requirements supported by countless military specifications, the JASSM programs has only three key performance parameters. All other requirements are tradable to obtain a missile below the threshold average unit price of $700,000 per missile.

The contractors will perform robust cost-performance trade studies in developing the System Performance Specification and the lower-level specifications. The Cost-Performance IPT will play an integral role in assessing the cost-performance trade data and ensuring performance requirements do not drive cost in an unreasonable manner. The Milestone I Acquisition Decision Memorandum includes a requirement for the OSD CAIG to reassess program cost and average unit price prior to the Milestone II decision.

JDAM Program

Desert Storm demonstrated the need for more accurate delivery of munitions in adverse weather. The Joint Direct Attack Munition (JDAM), which evolved from that need, is a low-cost inertial guidance kit for inventory 1000-lb and 2000-lb bombs. The inertial guidance kit attaches to the bomb, is aided by the existing Global Positioning System (GPS) satellite signals, and uses tail fin movements to direct the bomb to the desired target. The JDAM program is an Air Force-lead joint program with the Navy. We plan to convert tens of thousands of "dumb" gravity bombs into "smart" bombs that can be accurately guided to precisely attack fixed, or relocatable, land and maritime targets under adverse weather conditions from medium and high altitudes. The JDAM

units will be employed from the B-1, B-2, B-52, F-15, F-16, F/A-18, F-22, and the AV-8B aircraft.

To focus on lowering average unit cost and manufacturing risk, two 18-month contracts were awarded to Lockheed Martin and McDonnell Douglas in April 1994. In October 1995, the Department down-selected to a single contractor (McDonnell Douglas) to complete the development and operational testing. Safe separation tests of the 2000-lb variants have been performed on the F/A-18, F-16, B-52, B-1, and B-2 aircraft. Separation testing of the 1000-lb variant has begun on the F-16, as a surrogate for the F-22. We also recently began captive carriage testing of the guided test vehicles on the F-16 to test weapon functionality internal to JDAM. To date, JDAM flight testing has been 100% successful. The Low Rate Initial Production phase of the JDAM program is scheduled to begin in mid fiscal year 1997.

We started the program in 1993 the old way and estimated that we could get the cost of each JDAM modification kit down to about $42,000 by the time we converted our 40,000th unit. Soon after we set out on this path, Congress passed the Federal Acquisition Streamlining Act of 1994 and designated JDAM as an "acquisition pilot program." This Act granted relief—on a temporary basis for these pilot programs—from the statutory basis for many government unique requirements. At the same time, the Department implemented regulatory reforms to provide increased flexibility for procuring commercial items and using commercial practices.

In 1993, the JDAM request for proposal contained a 137-page work statement and 87 military specifications. Last year, with our implementation of acquisition reform initiatives, we streamlined the statement of objectives to a 2-page performance specification—indicating what we wanted the system to do; not how the contractor should go about doing it. And this time, we had no requirement for any military unique specifications or standards.

Early this fiscal year, we signed a contract for JDAM kits that cost $18,000 each—starting with the very first units. Our average unit price per kit at the 40,000th unit is estimated to be $14,000. This is compared to our original cost goal of $42,000. When

you are buying over 85,000 such kits, that amounts to a major savings—approximately $2.9 billion or about 50 percent of the original program cost.

The JDAM cost and time savings are primarily attributed to reduced Government specifications; early emphasis on manufacturing considerations including trade-off analyses within the design cycle; long-term relationships with the prime contractor and the subcontractors; and extensive use of Integrated Product Teams between the contractor and Government for the development and testing phases of the program.

The JDAM program is a prime example of acquisition reform success. Improved capability for our existing inventory bombs is essential. With JDAM, we will be fulfilling this critical need to our operational force earlier than expected and at a fraction of the original price.

AFFORDABILITY ASSESSMENT

The Defense Resources Board (DRB) is responsible, throughout the planning, programming and budgeting process, for ensuring the Defense Department is able to meet the challenges and threats of today and tomorrow. In accomplishing this goal, the DRB is required to review each weapons system on its own merit and as part of an existing force structure to ensure the capability brought to the table by the individual system merits the resources being devoted to its procurement or modernization. Specifically, the DRB is chartered to review the overall defense program with a view toward balancing resources available against the needs of the services; the Commanders-in-Chief; and the Department as a whole.

The process begins with the annual service Program Objectives Memorandum (POM) submission. The competitive nature of the POM evaluation effort reflects the realities of funding available to DoD and the trade-offs which must be made between weapons systems and capabilities. The Service POMs are analyzed during the Program Review Process, and issues are developed by joint OSD/Joint Staff teams. These issues

are often broad in nature, covering one or more Service, and one or more major acquisition program. The issues are analyzed in detail and alternatives are presented to a Program Review Group (PRG) which screens and refines the issues for presentation to the DRB.

The DRB is the decision making body for the Program Review which includes the Deputy Secretary of Defense, the Service Chiefs, the Under Secretary Of Defense for Acquisition and Technology, the Chairman of the Joint Chiefs of Staff and other senior defense officials who have a vested interest in balancing resources and capabilities. Ultimately, it is the function of the DRB to decide whether or not the Service POM's have correctly balanced available resources to achieve the most capable defense for the least cost and to ensure that the trade-offs between programs are mutually supportive and do not result in "holes" in the nation's shield.

As part of the Program Review, the DRB is often presented reviews of long-term affordability. In the case of tactical aviation, this long-term view has been presented annually to the DRB during the Program Review process. The issue of overall affordability of tactical aviation modernization was most recently addressed at a special Defense Resources Board (DRB) meeting convened by the Deputy Secretary in April 1996. The special DRB participants, composed of Service Chiefs, Service Secretaries, Service Acquisition Executives, as well as the Director of Program Analysis and Evaluation and other principals from the Office of the Secretary of Defense, reviewed long-term tactical aviation modernization requirements and validated the current approach to proceed with the F-22, Joint Strike Fighter and the F-18E/F.

They found that overall aircraft investment was within historical norms and affordable within other Service priorities. The DRB members observed that during the early eighties aircraft investment was accorded approximately 30 percent of the Department's total investment budget (RDT&E and Procurement). Major expenditures were for bombers, tanker (mobility) aircraft and tactical aviation. During the current projection period, with the F-22, F-18 E/F and Joint Strike Fighter coming into the procurement phase of the development cycle, the aircraft investment percentage

of the investment budget hovers a little below 25 percent. Clearly, tactical aviation is the leading investment resource, but sustainable since we have concluded our major buys of bomber and transport aircraft. This projection fits the historical norms of the late seventies and early eighties, when F-16, F-18 and F-15 aircraft were in production and TACAIR investment reached almost 25 percent of the total DOD investment dollars.

The plan implemented in the fiscal year 1997 President's Budget Request is being reviewed annually, and some of the details will undoubtedly change, but the plan is sound because it addresses the long-term core needs of the services and accomplishes the following three basic objectives: (1) sustains platform modernization through new aircraft development and procurement that supports long-term force structure goals and protects US qualitative advantages; (2) improves the accurate guided weapons carried by increasing standoff-range, enhancing all-weather capability and reducing costs; and (3) develops a dominant capability to exploit off-board, all-source intelligence information.

The 1995 Heavy Bomber Force Study revealed the leveraging influence of advanced accurately guided munitions. The difficult question of the most appropriate mix of weapons and delivery systems is being considered in an on-going Department study, the Deep Attack/Weapons Mix Study (DAWMS). The study is evaluating aggregate requirements for deep strike weapons and their delivery systems for two nearly simultaneous major regional conflicts (MRCs), plus possible demands from lesser contingencies. It also is reviewing command, control, communications, computer, and intelligence (C4I) architectures and related systems that support the planning and execution of deep attack missions. The study, with expanded treatment of force structure considerations, is planned for completion by the end of calendar year 1996. Emerging results will be used in establishing procurement priorities and inventory goals for the Department's fiscal year 1998 budget request and the fiscal year 1998-2003 Future Years Defense Program.

SUMMARY

Chairman Weldon, Chairman Hunter, members of the subcommittees, thank you for the opportunity to discuss our plans for modernization of US tactical aviation forces. We have worked diligently to field forces capable of achieving air dominance—air superiority and the ability to strike any target from the air—within hours after the start of any future armed conflict.

Let us leave you with three thoughts. The first is that the Department has effective processes and independent checks and balances in place to oversee requirements generation, acquisition management and program affordability.

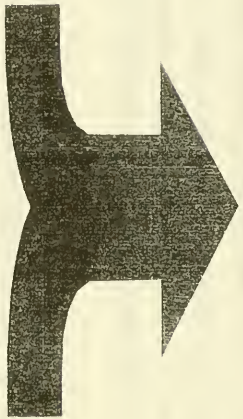
The second is that we believe the Department's overall tactical aircraft and weapons modernization plans are sound. The number of these platforms, the mix of weapons they will carry, and the off-board systems that will supply them with tactical intelligence are the subject of continuous, on-going affordability and cost-effectiveness studies.

Our third point is that these programs are executable. The requirements have been scrubbed. The threats are realistic. The cost estimates incorporate the Department's new affordability and acquisition reform initiatives. And we have looked at the alternatives and performed thorough cost-operational effectiveness trades.

We have been, and will continue to be responsible stewards of the Nation's resources as we continue to maintaining a legacy of technological and warfighting supremacy at an affordable cost. We believe the President's fiscal year 1997 budget request is the most affordable approach for modernizing US tactical aviation forces and securing "air dominance" well into the 21st century. We thank you for this opportunity to appear before the Subcommittees and shall be happy to answer any questions you may have.

TACAIR Roadmap

CURRENT		FUTURE	
F-14	(1970)	F/A-18E/F	(1995)
F/A-18	(1974)	F-22	(1997)
A-6	(1969)	JSF	(2004)
AV-8	(1977)		
F-16	(1974)		
F-15	(1972)		
A-10	(1973)		
F-111	(1963)		



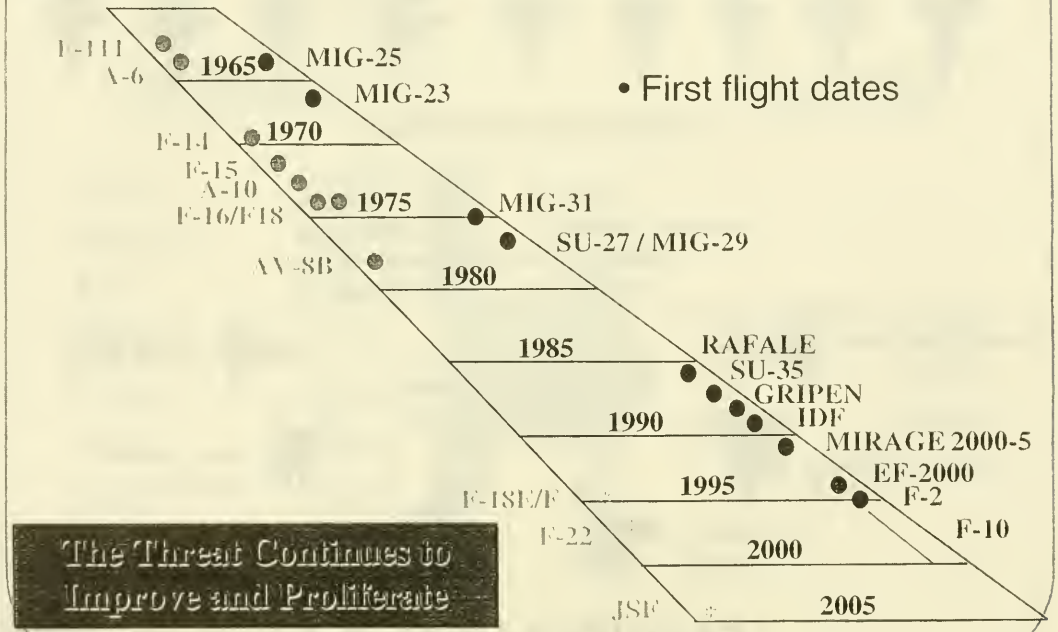
Foreign Fighters

- Acceleration
- Maneuverability
- Engine thrust
- Rate of climb
- Avionics
- Firepower
- Radar signature
- Range

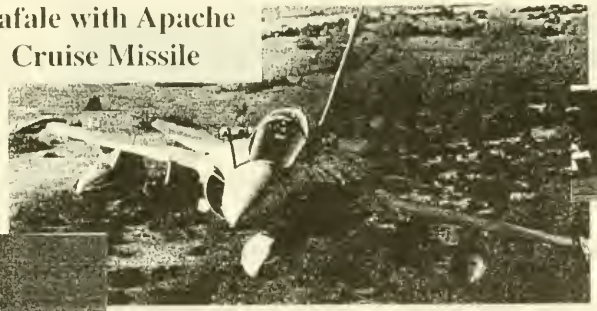
Projected Inventory

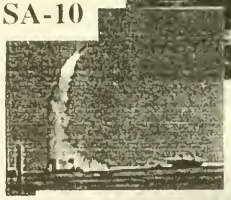
MiG-25/31	F-16	MiG-29	Tornado	Su-27	Mirage 2000	F-15	F/A-18	Viggen
1,440	1,270	920	810	380	350	330	270	140

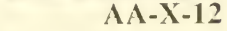
Fighter Aircraft Roadmap



Threats to US Forces







The Threat Continues to Improve and Proliferate

OLD

- One for one replacement
- Single service weapons
- One dimensional modernization
  - better aerodynamic performance

ACCEPTABLE STANDARD:
Favorable Kill Ratio

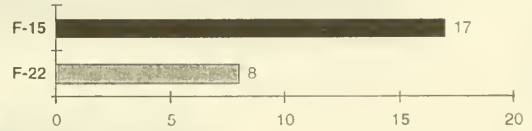
NEW

- One for many replacement
- Commonality of weapons
- Multi-dimensional modernization
  - better aerodynamic performance
  - stealth for first look - first kill
  - able to accept offboard information
  - reduced support requirements

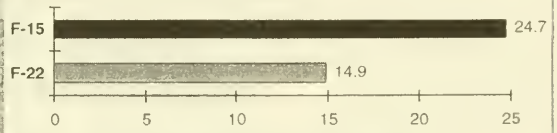
ACCEPTABLE STANDARD:
Total Air Dominance

F-22 Advanced Tactical Fighter

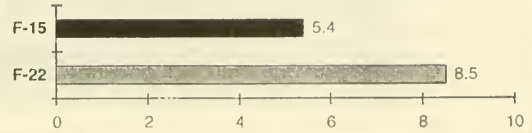
C-141B's to Deploy 24 PAA Squadron



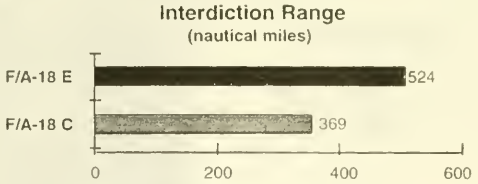
Manpower Spaces per Aircraft

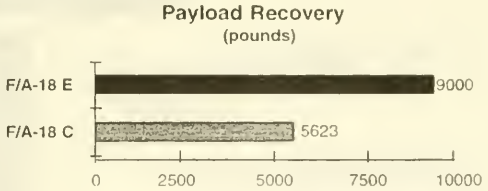


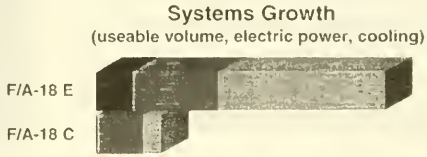
Combat Sorties Between Major Maintenance



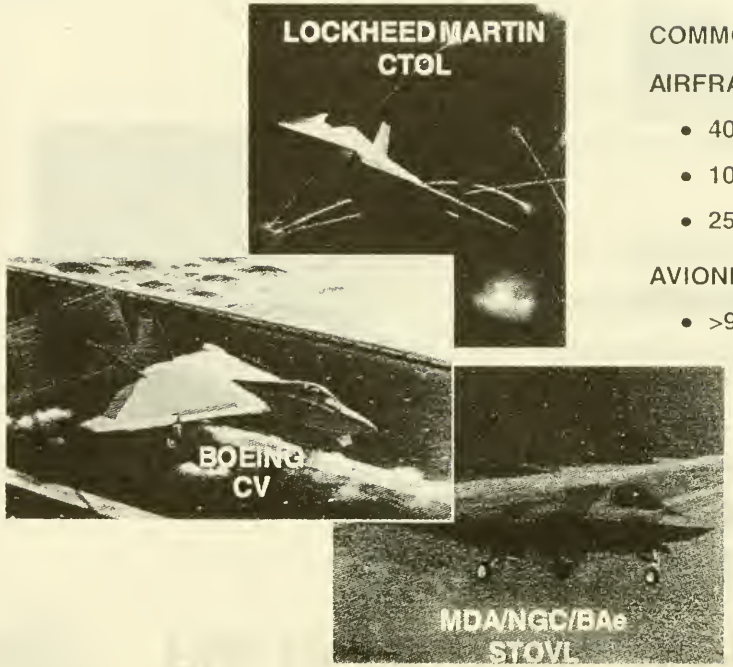
F/A-18 E/F Super Hornet







JOINT STRIKE FIGHTER



COMMON CRUISE ENGINE

AIRFRAME

- 40 - 60% COMMON PARTS
- 10 - 20% "COUSIN" PARTS
- 25 - 30% UNIQUE PARTS

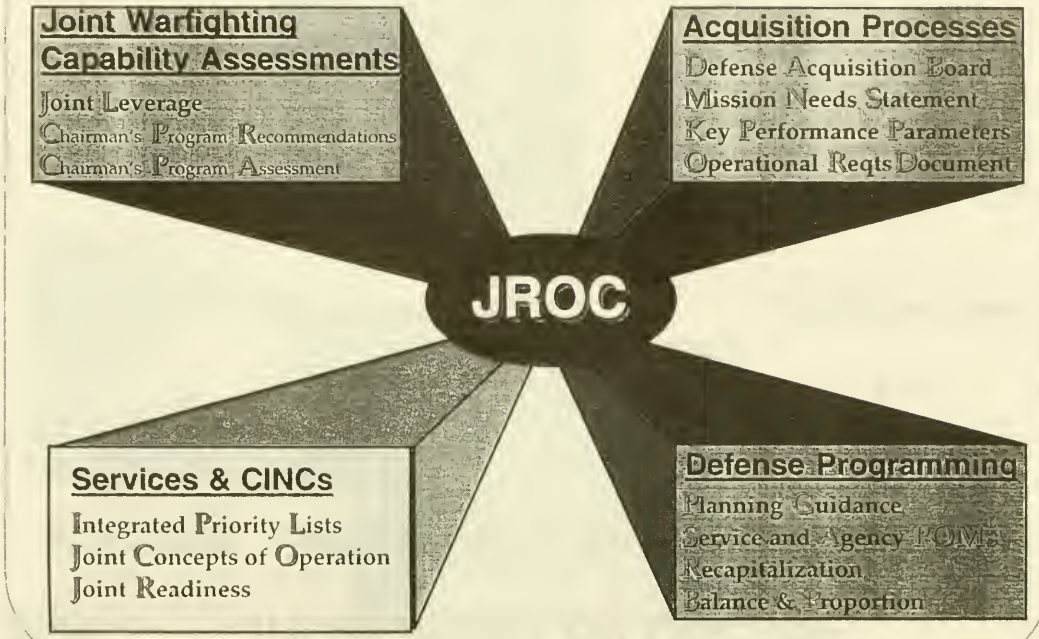
AVIONICS

- >95% COMMON

Investment by Decade

1970's TACAIR	1980's Strategic	1990's Mobility	2000's TACAIR
A-6	Peacekeeper	Fast Sealift Ships	F-18E/F
A-7	Small ICBMs	Large Medium Speed RO/RO	F-22
A-10	Trident Submarine	C-17	Joint Strike Fighter
F-14	D-5 SLBM	C-130J	
F-15	Advanced Cruise Msl		
F-16	B-1		
F-18	B-2		
F-111			

JROC Linkages



Mr. WELDON. Thank you, Dr. Kaminski, and thank you, General Ralston for your statements and for the charts and graphs. They were very helpful. If we could call back our two panelists, Dr. Williams and Mr. Davis, we will then begin to go into the questions. And Mr. Rodrigues, I understand, is also going to join us. I will try to keep my questions short so that we can get to every member. We will operate, I guess, under the 5-minute rule to give every member a chance to ask questions.

Again, let me thank you all, and I am going to start off, since this is on a tac air hearing, obviously most of the questions are going to be on tac air. But, Mr. Davis, I am going to start off with a question to you, because your testimony highlighted to me when I read it last night a problem that we have on this committee that deals with getting good, solid information both from the intelligence community and from Federal agencies about the threat that is out there and what is happening in the world so that we can base our policy decisions on the best advice that we can get, and we would hope that that advice would be consistent and would not be biased. As you know, there is an ongoing dispute between Members of this Congress, including myself, and this administration over that very issue in terms of our intelligence reports, and it goes at the core of how we can make our decisions here.

What struck me—and perhaps there are other examples, but this stood out in a very evident way—was the assessment provided that the arms market worldwide has decreased dramatically and that, therefore, the perception is being created, I think, in your testimony that it certainly is not the problem that it was perhaps in the 1980's, which I would agree with. But I think we have to get down to the specifics. In your testimony, you talk about the Russian sales of arms, I think at one point $3 billion in 1994. And I asked staff to give you a copy of a Reuters story that quoted Prime Minister Soskovets that I had saying that Russia's arms sales in 1995 were going to be about $3 billion.

Now, that is fairly close, because they do indicate in that story that there is an increase over the previous year. But I had to contrast what your statement said versus a briefing I had asked the Institute for Defense Analysis to give me about a month ago, and I asked staff to quote this to you so you could prepare prior to coming in here this afternoon. It was put together by Andrew Hull and David Markoff, and it is entitled "The Changing Nature of the International Arms Market." I have a copy of it here. In fact, I told the subcommittee staff we're going to have a briefing on this for the entire subcommittee, because it deals with the issue of arms proliferation, and that's very important to what we do, because it tells us what is happening in the world community.

Now, if I could get the chart back up that you showed us that talks about the worldwide transfer of conventional arms; could someone put that back up over there so we can look at it, please?

Mr. DAVIS. Sure, yes.

Mr. WELDON. This chart is depicting the decline in conventional arms transfer. And if you look at the chart—and I would ask my colleagues to look at it—if you look at the final year's numbers for 1994 on the chart, it comes in somewhere above $20 billion. I don't

know what the exact amount is. I know it is probably between $20 billion and $30 billion, I would assume.

Mr. DAVIS. I think that is right.

Mr. WELDON. But the Institute for Defense Analysis, another Federal agency that I also trust, in their study said that the arms market in 1994 was $39 billion. Now, here is what bothers me: Your chart is based upon figures from the Arms Control and Disarmament Agency, which should not, but which I think may sometimes, try to minimize or minimalize the amount of arms transferred to prove the point that perhaps arms control agreements that you cited are, in fact, working very well.

This document, also done by a Federal agency, cites reports by Jane's, which is highly respected worldwide certainly and is certainly no arm of anyone in the beltway here and also cites other documents on the international market and basically puts it at $39 billion. Now, how can we have a discrepancy of almost twice what you are telling us what the market is with two Federal agencies trying to give us information?

Mr. DAVIS. Let me try to answer that. The point that we were trying to make in this section had to do with the capabilities of recognized adversaries in regional-type conflicts, and we pointed out the numbers and quantities of the assets that they have. We also wanted to point out what would be the likelihood of that situation changing over time, and there were a number of factors that needed to be considered. And one of the issues is arms transfer. We got that information from the Arms Control and Disarmament Agency as you said. It goes through 1994.

The documents that we originally had to look at were classified documents. We had to go through the procedures that we had to go through to make sure that we could use certain information in an unclassified way. The documents that we looked at that were classified also talk about what it is likely to be in the future and so forth, and we tried to describe that in an unclassified way. What we tried to point out was that these were obstacles that these countries would have to overcome.

Hopefully, we did not want to leave the impression that these controls that are in place, namely the United Nations sanctions, the Wassanaar Agreement and the Missile Test Control Regime [MTCR] in any way are ironclad and prevent leaks from going through. But the information that we had came from the ACDA. I am not familiar with that study. We did get the information; as you said, it was passed to us. I would be happy to go back to find out the source of their information and try to reconcile the differences as best we can. I would be more than happy to do that.

Mr. WELDON. I am not trying to be critical of you personally.

Mr. DAVIS. I understand.

Mr. WELDON. But the problem you have to understand that we face is we are not experts in terms of the international arms market. We rely on our agencies. And one of the most difficult problems that I have personally is getting good, solid data based on fact, especially from the intelligence community, and I have said that publicly many times and most recently about the National Intelligence Estimate [NIE] that was released last year.

But here is a case where we have two Federal agencies giving us grossly distorted information about the same point of information. There is something wrong there, and how can we be expected to respond to that? And what is even more significant is the perception being created by your testimony in terms of the decline is that it is so dramatic that we do not have to necessarily feel as concerned about the arms proliferation as has perhaps been the case in the past.

But this document makes the case in a different way, and this is also a Federal agency. In fact, they go into a whole section in here that I would also ask you to look at that says a lot of the financing of arms sales today in the world are not by direct dollar purchases. In fact, Russia is largely providing equipment—the Su fighter and other aircraft—to other countries by trading goods, by trading oil, by writing off debt, by trading food. Is that all factored in? And if is it not factored in, that makes the value go higher.

The point that I am trying to make is that it is very frustrating for this member to really feel confident with any of the information that we are being given because it tends to be so disparate, and it tends to, in my opinion, be sanitized by whoever is presenting the data. And I hate to say this, but my own initial assumption was that the Arms Control and Disarmament Agency is saying it is that low because they want the world to think that arms control agreements are working; the MTCR is working so aggressively well that we have had all of these successes. And I intend to follow that up with them, but I wanted to point that out because at the outset, that creates the perception upon which we have to make decisions as to how to fully fund our military's requirements for in this case tactical aviation but every threat we face: missile defense; the whole issue of our ships and our submarines. And it's a very perplexing problem for us to have to try to fathom through Federal agencies funded by the taxpayers with such divergent opinions as to what the status of the threat is out there.

And with that, I'll move on to—and I have a number of other questions, but I'm going to operate under the 5-minute rule—the distinguished chairman of the full committee, Mr. Spence.

Mr. SPENCE. I was just wondering—a leadoff question, Dr. Kaminski and General, the GAO report on Navy aviation, F/A–18E/F will provide marginal operational improvement at high cost. Could you just give us the benefit of your response to that statement?

Mr. KAMINSKI. Mr. Spence, I will let General Ralston comment about the performance aspects of the aircraft. I would just say two things with respect to the growth for future capabilities; that is very important to me. There is a very big difference in growth margin in terms of being able to deal with the future. With respect to the cost, the numbers I showed when we reach the steady-state production was a little bit less than 25 percent difference in cost on an apples-to-apples basis. When you look at the last C/D that was produced and an E/F produced at the comparable point, you will get different numbers in different years for average costs because of the way those curves come down and the way I described. But I think what we're talking about here is something on the order of 25 percent or less, different unit flyaway cost.

Also, all the support equipment for the aircraft, that's about 80 percent common from the C/D to the E/F. So, one of the benefits of this kind of an upgrade is being able to use all of that support equipment or at least 80 percent of it.

General RALSTON. Mr. Chairman, one of the parts of the report had to do with just make some mods to the F–18C/D; for example, just put a 480-gallon tank on it. One of the problems you get into, yes, you could put that tank on there, but the airplane is not stressed for it. The gear is not stressed for it. And pretty soon, you start modifying and modifying and modifying; then, you have to have a bigger wing. And, in fact, that is what an F–18E/F is. So, that in essence is the approach that the Navy took on that was to take the C/D, modify it as necessary, get the performance that I showed you in terms of increased range and increased ability to bring payload back aboard the carrier, and that is the F–18E.

Mr. SISISKY. Will the gentleman yield?

Mr. SPENCE. Sure.

Mr. SISISKY. What is the mileage, the difference between the C/D and the E/F? One of the reasons I oppose the E/F really was because of the legs on the plane. It just didn't have the reach that I thought we needed, particularly off of carriers, which I had heard from Admiral Ednay many years ago, you need 700 miles each way.

General RALSTON. The top bars up there, sir, are the E model—and somebody help me read it; I think it is 524 versus 369. It is about a 40-percent increase in range.

Mr. SISISKY. What is it again? Excuse me?

General RALSTON. About a 40-percent increase.

Mr. SISISKY. I mean, what is the range of the E/F?

General RALSTON. Five hundred and twenty-four miles.

Mr. SISISKY. And the C/D?

General RALSTON. Three hundred and sixty-nine.

Mr. SISISKY. OK.

General RALSTON. That is radius. That is one way.

Mr. SISISKY. That is why they wrote about the pod in there to—but you are right, you would need a larger wingspan.

OK; thank you very much.

Mr. SPENCE. That is all I have.

Mr. WELDON. Thank you, Mr. Chairman.

Mr. Taylor is recognized for 5 minutes.

Mr. TAYLOR. Mr. Chairman, if you do not mind, I would like to save my time for later on.

Mr. WELDON. Absolutely.

Mr. Stump is recognized for 5 minutes.

Mr. STUMP. I have no questions.

Mr. WELDON. Thank you.

Mr. Bateman is recognized for 5 minutes.

Mr. BATEMAN. Thank you, Mr. Chairman, and I thank the witnesses. It has been very helpful, I think.

One of the things that I wonder, if it is properly a part of this equation, is maintaining an industrial base. If we don't go forward with new systems, when the time comes when we must have new systems, who is going to build those new systems? So, it seems to me you almost have to inject an element of that into the total na-

tional security implications of when we modernize and how quickly we modernize, or, some would see it how slowly we modernize. Do you have any comments on that?

Mr. KAMINSKI. Yes, Mr. Bateman, I do. I would say the way we go about this in the Department is in the other order. The first thing we do is determine what we need to buy. And we proceed with our industry activities, with our funded effort, on the basis of what we need to buy. We then have a process that looks to see, based on what we are buying, have we left ourselves a problem in some piece of the industry? Is a piece of the industry that we need going to go away because we are not buying enough?

What we have been able to determine thusfar is that there are very few situations where what we were buying was not enough to sustain the industry capability we need. But we do have a process in place to look at that if we are not buying enough so that we can take corrective action. We do that only when we must.

Mr. BATEMAN. The other aspect of this that I am not sure that I have heard enough on and whether or not just spontaneously I will get enough of it today, but in terms of modernization and other systems that are going to compete for the budgetary resources available, we have new attack submarines; we have the arsenal ship; we certainly are going to need a CVN–77 at some point in the very near timeframe if we are going to maintain the carrier capability that is even minimal to requirements. Are we going to be able to do those things? Are the financial projections or the budgetary projections such that we can fit those programs, those modernizations into the scheme of things?

Mr. KAMINSKI. As I was showing on my chart, Mr. Bateman, I think we can do this tac air piece for about what we historically have been investing in the area. I indicated that there were challenges in bringing these programs in. So, too, will there be challenges in the other piece of our investment budget. I believe it is doable, but I do believe we will have to have this increase in procurement that we have been planning for in our FYDP actually come about, or we won't be able to do it.

Mr. BATEMAN. I will conclude simply by saying that I long for an era when we will budget the national security requirements what the requirements are rather than the other way around of having a national security budget that is arbitrarily determined without respect to what our requirements are.

Mr. WELDON. Thank you, Mr. Bateman.

The gentleman from Pennsylvania, Mr. McHale.

Mr. MCHALE. Thank you, Mr. Chairman.

Gentlemen, Dr. Williams, good afternoon. I confess that I come to this issue without a parochial agenda and very much with an open mind. So, if some of my questions sound skeptical, let me assure you I am really just trying to gather information here. In the annual report of the Secretary of Defense to the President and the Congress, on page 181, the statement appears: "The F–22, while very capable, never has been intended to fill the full, 20-wing Air Force structure because of its high cost relative to other aircraft."

Initially, what I would like to get from you is some sense of that cost and particularly in the context of a comparison to the Joint

Strike Fighter. So, my first question is what is the peraircraft acquisition cost of the F–22 compared to the Joint Strike Fighter?

Mr. KAMINSKI. Let me get those numbers for you.

General RALSTON. While he is getting the number, let me talk to it in these terms. In our current force structure, as well as our projected force structure, we have what is called a high-low mix. In the case of today's force structure in the Air Force, for example, the F–15 is the high end of that mix, with the F–16 being the low end and the vast majority of numbers being in the F–16 low-end side, and that is roughly a 2-to–1 ratio. An F–15 costs about twice as much as what an F–16 does.

In round numbers, I am going to give you the same ratio for the F–22 and the Joint Strike Fighter, the F–22 being the high-end, small-percentage mix, and the Joint Strike Fighter being the vast majority of the airplanes at the low end.

Mr. MCHALE. I understand, and I would appreciate that.

Doctor.

Mr. KAMINSKI. To respond to your question on costs, we still have a range of unit costs expected for the Joint Strike Fighter, and that range is from about $28 million to about $38 million per unit. It varies on the application by service. And that is in fiscal year 1994 dollars.

Mr. MCHALE. All right.

Mr. KAMINSKI. And in comparison, the unit procurement costs for the F–22, and approximately, this number is in 1997 dollars, so we have about 3 years of inflation to adjust.

Mr. MCHALE. I understand.

Mr. KAMINSKI. That is $72.6 million.

Mr. MCHALE. All right; would you similarly compare the life cycle costs of the F–22 and the Joint Strike Fighter?

Mr. KAMINSKI. I do not have those numbers with me. If someone behind me does, I will supply those for the record if I may, Mr. McHale. I don't have those life cycle costs with me right now.

Mr. MCHALE. I would appreciate that.

Finally, you're hearing questions from a guy who is reasonably competent at cleaning rifles but is not terribly knowledgeable when it comes to aircraft. Could you, in a thumbnail sketch, compare the operational capabilities of those two aircraft?

Mr. KAMINSKI. Yes, sir; let me try that. In the case of the F–22, this is an airplane that is designed primarily to achieve air superiority. It has a very low signature; it allows it to go into enemy territory and see the enemy aircraft before the enemy aircraft can see it. It will be equipped with our latest air-to-air armament, the Advanced Medium Range Air to Air Missile, and it is a very good airplane to get us air superiority and this air dominance that we talked about, because that is so critical for all the other operations that we do for our soldiers on the ground and for our ports and all to achieve that air superiority. In the case of the Joint Strike Fighter, it is primarily designed as an air-to-ground airplane to support the troops, to interdiction. It will have an inherent air-to-air capability, but it is designed primarily for air-to-ground. The F–22, on the other hand, being primarily air-to-air, will have a secondary air-to-ground capability.

Mr. MCHALE. Could you be a little more specific in comparing the fighter capabilities as opposed to the attack capabilities of the two aircraft? I understand completely, General, your description as given so far, but in terms of air-to-air combat in establishing that air superiority, how do the two aircraft compare?

General RALSTON. The F–22 will be significantly superior to the Joint Strike Fighter in air-to-air. It will have a much larger radar volume, a much longer radar range. It will carry more ordnance. It will have greater range. It will be able to fly supersonically without afterburner, so supersonic cruise and very good maneuverability.

Mr. MCHALE. My red light has just come on. If I may have an additional 30 seconds just to conclude, in light of the dramatically higher price than for the F–22 and in light of the fact that, at least, based on the current report from the Secretary of Defense, the initial operational capability between these two aircraft is only 5 years apart. Is it accurate to say, then, that it is the superior fighter capability of the F–22 that would largely justify its acquisition rather than skipping the F–22 and going immediately to the JAST?

General RALSTON. Absolutely.

Mr. MCHALE. I very much appreciate your answers. They have helped me considerably in understanding the issues.

Thank you, Mr. Chairman.

Mr. WELDON. Thank you, Mr. McHale.

The gentleman from California, Mr. Cunningham, is recognized for 5 minutes.

Mr. CUNNINGHAM. You did pretty good for a Marine Corps person, Max.

Sometimes, you kind of feel like Billy Mitchell in the fact that many of us on both sides of the aisle fought against the F–18E/F in the first place. As a matter of fact, I laid a check for $50,000 of my own money on Dick Cheney's desk and told him that the airplane would end up with less capability. The R&D at that time he promised would cost no more than $2 billion; that it would exceed $5 billion. You remember that. And that the airplane was only 15 percent common with the F–18, and there was a lot of risk involved. We are beyond that. I mean, you cannot turn around. The F–14 to me would still have, even with the forward—without getting classified—capability, we could put it in a forward corridor would still go further, faster, carry more, and you do not have all the risks. We are beyond that.

Second, I got in trouble when I was a lieutenant when I made comments we should not sell the F–14's to Iran. I said I do not want to look down the barrels of those sometimes, and I got in a whole lot of trouble when I was still in the Navy. I felt like Billy Mitchell there too.

I also feel like Billy Mitchell in looking at we are not here because of either side of the aisle, but part of it is because I believe that there is an agenda that if we can hold off as much as possible our investment in modernization, the liberal left of this Congress in both bodies feels that if they can keep pushing us back and pushing us back from A–12 to A/F–X to the rest of it that they know that there is no way that we can afford the dollars in the out years to modernization. We just cannot do it.

So, what does that mean? You have got to cut your force, and then, they have got more money for great social programs. If you do not have enough airplanes, why do you need that carrier, Admiral? And the same thing with the Air Force or the Marine Corps. And that is where we are at right now, and I hear from all sources. I do not know what to do at this point in prediction at all, except that this member—and I would hope the other members—would look seriously at doing every single thing we can to speed up JAST as much as possible.

Why? First of all, if it turns out to be an Edsel, we are in big trouble in all services. Second, that if it slides, we have had the Joint Chiefs talk about the modernization and the dollars required. But if it slides at all, there is not much room for error there at all. And I think you would agree with that. And I am concerned with the F–18E/F, and I know that we have got to buy them, because we have got to fill the decks. What I would do is increase the procurement on F–18C/D.

Now, I don't ride in the airplanes. I have actually flown them, and I test a lot of the new equipment. The C/D is remarkably different than the first models with the capabilities to come out, and I cannot talk about the programs here. And the Strike Eagles, I think we have got to boost up the Air Force with the Strike Eagles to cover this period. If we do not, we look at the threats that we are in right now worldwide, and I think that we are limited. And with the F–16 service life that you are going through a reduction, you know, with Top Gun, we lost all of our F–16's because of the service life. We do not have any adversary program any more. It kept us full-circle from being successful.

But boy, we sure need your help on this one, and we need it not to be political, but what we need to survive. Because I will tell you something else that really scares me—and this is not partisan; I want to let my colleagues know that. But it is looking at the actual problem. When the administration relies on inflation not getting any higher than 2.5 percent over the next 7 years, and when they talk about acquisition reform—and I think Secretary Perry—I do not like it because he is not a defense tactical expert, but I think he has done a good job in acquisition reform. And some of the comments out of our party, I think the disrespectful comments to Secretary Perry are out of place, and I want you to put that on the line. He is a good guy.

But the administration's relying on Base Realignment and Closure and acquisition reform and inflation is not going to get us anywhere close to these lines that you are drawing here in the out years, especially when he says his balanced budget, where 70 percent of his cuts come in year 2001. And I looked at you, Spike. Do you think the liberal left of this body is going to increase defense spending when Medicare is going to fail in that timeframe? No. So, I think your challenge and the challenge of this body is extreme with what we hear. And if we do not do it smart, in my opinion, we need to beef up JAST. It has got to be a high-end airplane and a super airplane, and I think we need to stretch out the F–14's as much as we can to fill the gaps and the C/D's in support, and then, the Marine Corps, the fixes we put in the AV–8's so that we do not lose those things at 33 percent, we need some accurate figures.

And, like Mr. Weldon is talking about the overseas sales, that all matters as far as the cost on these things. But I would hope you would help the committee as much as you can on these things, because I will tell you: I am scared right now with the future of national security in this country.

Thank you, Mr. Chairman.

Mr. WELDON. I thank the gentleman.

Would anyone like to respond?

With that, we will move on to the gentleman from Virginia, Mr. Sisisky for 5 minutes.

Mr. SISISKY. Thank you. I was going to respond. I agree with most of what my friend says except for one thing: You talk about the liberal left that canceled the A–12; it was Mr. Cheney that canceled it, and I do not want you to call him liberal left.

Mr. CUNNINGHAM. I fought Dick Cheney tooth, hook, and nail on it. That is why I said there is support from the other side.

Mr. SISISKY. Well, as far as I am concerned, we made a mistake. The Government made a mistake on the A–12. For $3 billion more, we would have saved $19 billion in research. And we have got a stack of papers, but I think that is where we made the mistake.

But regardless of that, my friend is absolutely correct. I am scared to death, because I look at the FYDP. You are not going to have enough money to recapitalize tactical air when you have got to recapitalize ships almost at the same time. You know, we have got four more submarines being built; we are talking about an aircraft carrier, an arsenal ship and all of these things that we have got. We have got the V–22 coming out, almost missile defense. [Laughter.]

Mr. SISISKY. Three plus three would be all right. But he does not believe in intelligence reports, so I have got to—you know, I have got to personally looking at some things now.

Mr. Kaminski, I think we are going to have to worry about funding this in a different way. You know, we can talk about incremental, but the Senate does not like that, and the Appropriations Committee does not like it. But we had better get another name for it. If we spend $4.5 billion to build an aircraft carrier, we may have to mortgage it. And I am looking to find a way, but you have got more resources to find a way. We have got to find a way. We have got to find a way to absolutely capitalize tactical air and other air. We have got to find a formula. My gentleman from California is absolutely right. We are basing a lot of things on inflation, and that could be very dangerous in the future.

We do have something good, though. You know, I do not think anybody, any country could even come close to us in the F–15E. Am I correct in that, General? That is a top-of-the-line aircraft, and I do not think there is another aircraft built like that.

Mr. CUNNINGHAM. May I interject something?

Mr. SISISKY. Yes.

Mr. CUNNINGHAM. Take a look at the Su–27 and the follow-on and the A–10 missile, which is superior to our Amram.

General RALSTON. Mr. Sisisky, that is correct. The F–15E is a good airplane; do not get me wrong. But aerodynamically and in propulsion, the Su–27 today outperforms the F–15.

Mr. SISISKY. Well, that is good. I just left an opening in there, because that is why we need the aircraft. But the real problem is going to be how in the devil are we going to pay for this stuff? I just cannot see it. And the gentleman is absolutely correct. We are facing health care problems; Medicare. And I will tell you: It is not just the liberal left that is going to face it, because all of us have constituents who are dealing in that, and sooner or later, it is going to catch up with the Defense Department. I hate to say that, because the world is still an unsafe place, and all of us who look at defense know that. But you ask the average citizen out there, and they are not sure that this world is not a safe place now.

So, all I would say is that we have got to find a way, a unique way, to finance some of these things so we can keep that tactical edge, and I have really no questions for you except just the comments. Thank you.

Mr. WELDON. Thank you, Mr. Sisisky.

The gentleman from Indiana, Mr. Hostettler, is recognized for 5 minutes.

Mr. HOSTETTLER. Thank you, Mr. Chairman.

I thank the panel of witnesses. I would just initially associate myself with the remarks that my colleague from Virginia, Mr. Bateman, said at the very end of his statement with regard to I would hope that we would invert our discussion of what we need for national defense: Instead of looking at budgetary constraints and then developing a strategy for national defense around budgetary constraints, we would evaluate the perceived threats and create a strategy for addressing those threats and then funding to whatever level necessary to meet those projected threats, and I think one of the last boards that we saw from the GAO said that we needed to determine those things, so that is good.

But for the sake of discussion, one of the boards that we saw earlier with regard to tac air investment funding showed historical data for 1980 through 1996, and I guess for analysis' sake, that is good. But there is a period of time there that is part of that historical data that includes some funding after the 1993 Bottom-Up Review that took place. And as a result of that Bottom-Up Review, and as a result of funding levels that came after the Bottom-Up Review there was a study that was commissioned by Senator McCain and some former chiefs of the services studied it and determined that actually, the funding levels that we were engaged in were quite a bit significantly lower than what was necessary to meet the requirements of the Bottom-Up Review.

Mr. Davis, do you have an idea of what—I guess totally what the GAO said that that underfunding was? Do you remember those numbers?

Mr. DAVIS. We looked at the FYDP, the 1995–99 FYDP, as I remember, a couple of years ago, and our assessment was at the time that the amount of program that the Department of Defense had in the FYDP was about—there was a mismatch between the program and the expected dollars that you could see in the FYDP of about $150 billion. That was a mismatch between the two programs. I would like to point out that GAO's view is that that is not underfunded. There is a mismatch, and it gets to the very heart of what we are talking about here today in terms of what require-

ments are. And I think that is very important to assess what the requirements are, because if you accept the requirements, then maybe, you could judge that they would be underfunded.

But to the extent that there may be some questions about the requirements, then, that delta changes. Some of our work is shown not only in the acquisition area, as we pointed out in our report on the F–18E/F. There is a question about what the requirements are and what you need. And to the extent that that is a legitimate question, that affects what the top line number would be.

The other thing I would like to add to the discussion is that a lot of the work that GAO has done over the years and in areas other than acquisition point out that there are real opportunities for savings and doing things more efficiently that could generate moneys to reduce that mismatch between what is judged to be requirements and what the expected budgets are likely to be.

Mr. HOSTETTLER. But according to the report—and I understand the money side of it, but according to the report that was done by the former chiefs, when they analyzed the threat under the BUR, what it would take based on historical analysis, for example, the conflict in Desert Storm, they said there was a significant reduction according to what the administration was going to be funding in the future and including some of these years in this graph plus with regard to what we would need as far as tactical air squadrons and Army tank divisions but in this case squadrons to meet that threat.

So, my question is this: That given that historical anomaly for this time, should we not be looking at different numbers? I mean, if we are meeting the threat, which we did in the 1980's whenever we tested that in 1990 and 1991 with Desert Storm, and we met that threat, and we met it very well, in fact, we are not doing the same thing at this time according to that analysis and according to your own numbers, meaning we are underfunding it over a 5-year period by $150 billion. Do we not need to look at a different set of numbers with regard to what we need in the future to meet the demands of the threat?

Mr. DAVIS. Well, let me try to answer it a different way. When we looked at last year's FYDP, which was the 1996–2001 FYDP, and we are currently looking at this FYDP, it was clear that the amount of money that was in the procurement account and what Department of Defense and the Joint Chiefs have said they would like to have, recently about $60 billion a year, that they are a long ways away from that, and that their plan to try and get there is to achieve some savings through the infrastructure area and acquisition reform in other areas.

And our analysis has shown that when you look at the FYDP and the way Defense plans to spend their money from now through 2001, the outyears, they are not planning to save any money in the infrastructure. So, the real challenge DOD has, if they are intent on getting up to that $60 billion—and I think they are—that where is that money going to come from? And how are they going to get there? And General Shali himself has said regarding tactical air, he said that tactical air procurement plans call for much greater than the expected resources in the out years. And I think you even mentioned that, Chairman Weldon, yourself.

And he also said that, regarding the whole issue of recapitalization—and this is a very important point—that it will require significant changes in the allocation of defense resources. Significant changes are going to have to take place in how Defense is allocating their money today according to General Shali than what he sees in order to meet these requirements that he wants to fund in the outyears.

Mr. HOSTETTLER. Mr. Chairman, if I could just ask one question because of the response, and if this is going to be too long of an answer, then you can get it to us in typewritten form. But why are not the savings in infrastructure going to be recognized?

Mr. DAVIS. Our analysis shows that even though the Department of Defense has been able to save some infrastructure moneys as a result of issues associated with the BRAC and the closing of bases, at the same time, they are planning to spend money in other infrastructure areas. Right now, we are trying to analyze it in a little bit more depth so I can be more specific in answering the question, but I think also in Chairman Weldon's opening response, he referred to a report that we have issued on infrastructure and how the DOD is planning to actually increase this spending in the outyears rather than decrease it in terms of infrastructure.

Mr. HOSTETTLER. Thank you very much.

Mr. WELDON. Thank you, Mr. Hostettler.

And before I acknowledge for 5 minutes my good friend Mr. Geren from Texas, I would just add that during the years that we are in the production of all three aircraft, CBO estimates that the total annual allocation will be in excess of $15 billion a year. I do not know where those dollars are going to come from.

Mr. Geren.

Mr. GEREN. Thank you, Mr. Chairman.

I appreciate very much this panel's contribution today and the comments from the colleagues on the committee. We really are going to be faced with some difficult choices over the coming years if we are going to meet these needs, and I do not think the answers are very obvious today how we are going to get there.

But I would like to ask General Ralston, if you could talk about this interim period, the JSF and the F–22 and the F/A–18E/F we're talking about into the next century and with the JSF all the way to the year 2008 and talk about what our needs are between now and then in the tac air area and also what additional capability the 16, the 15, the 18 offer now compared to what they offered back in the seventies when they came on stream. I think often, we tend to talk about an F–16 1996 and an F–16 1994 as the same animal, and we fail to note that we are comparing models that are significantly different, and the same is true for all three of those aircraft.

So, if you could just focus on the next decade and what our tac air needs are during that period and what the plans are to address those needs.

General RALSTON. Yes, sir; let me first of all address what you had briefly said there, and you are exactly right. Whether you are talking F–16's or F–18's or F–15's, the models that we have today are significantly improved over what they were 20-some years ago. But technology has improved; threats have improved and so forth.

The other aspect is the numbers that we have. In the Navy, tac air has been reduced about 40 percent. In the Air Force, it has been reduced about 40 percent in numbers. The Marine Corps is a little bit less, but again, they have had a significant reduction. That shows up every day in what we call the ops tempo or the purse tempo. In my previous assignment at Air Combat Command at Seymour Johnson in North Carolina my last visit there, they were preparing for their 14th deployment to Dhahran, Saudi Arabia, since Desert Storm. And you only have a small number of wings. If you are down to 20 wings, every wing is going to be deployed a lot more often than it has been in the past, and this drives up the amount of time that our people spend from home. We are talking 5 years we are into this now, 6 years. This August, it will be 6 years we have had F–15's and F–16's in Saudi Arabia, and the same is true for the Navy and Marines in terms of their ops tempo and their deployment.

With regard to our requirements, we have looked at numbers out to the year in the case of the F–18E, for example, about 2016; in the case of the F–16 say 2010, when JSF should be coming onboard in significant numbers. And we apply the expected attrition factor, the cost of doing business for the next 15 years. We do not like to crash airplanes. If we lose one airplane, that is too many, but we know historically that we are going to lose airplanes, and you have to replace those. So, there will be some requirements to either replace airplanes through attrition or reduce force structure or take airplanes out of the boneyard and bring them back to the force structure. All of that has to be addressed. It does not necessarily have to be addressed in 1997, but it certainly has to be addressed between now and 2010.

The Department has chosen to do everything that we can do to expedite the joint strike fighter. We believe that is important; we believe it is important for commonality and to get the savings that will come from that. But we are still more than a decade away before you could have your first joint strike fighter.

Mr. GEREN. And if you could talk in a little more detail about the demands in the meantime: the operational requirements, the demands; I think that it is largely unappreciated in the general public and probably not across the Congress nearly as much as it is in this committee, but the demands that we are putting both on the tac air and on our servicemen and women during these times, and I think we find ourselves constantly trying to justify this interim investment. You have people saying, well, we are doing the F–22; we are doing JAST. Why do we need these 15's? Why do we need these 16's? Why do we need these 18's? And if you could, just in the time remaining, go into a little more detail on what you see as the needs are in this interim decades before these airplanes do come on and really start shouldering the bulk of the responsibility for these aircraft that have——

General RALSTON. Yes, sir.

Mr. GEREN [continuing]. Been our mainstay over the last 20 years, 25 years.

General RALSTON. Let me again use an Air Force example. In order to free up funds for modernization for the programs that we have talked about here, one of the ways the Air Force has done

that is to retire older systems: F–111's, F–4G Wild Weasels, EF–111's. These are very important systems. They have served us well. But they are older systems and more expensive to operate. We have been forced to take risk by retiring these systems early in order to free up funds for the future, for modernization. And that means that you are accepting a higher risk in the near term.

It means that we have had to have more Block 50 F–16's for the Wild Weasel role, for example, to replace the F–4's, all of which just retired in the last 3 months when we retired our last F–4G Wild Weasel. The F–111's will be gone by the end of this year, and they have to be replaced by F–15E's, longer-range interdiction airplanes. So, we are trying to address that right now. There is risk associated with that. I believe it was the correct decision to go ahead and retire those older systems to free up for the future, because if we do not do it now, we are not going to have the F–22's and the F–18's and the Joint Strike Fighters when we need them.

Mr. GEREN. Thank you, General; thank you, Mr. Chairman.

Mr. WELDON. Thank you, Mr. Geren.

The gentleman from Maryland, Mr. Bartlett, is recognized for 5 minutes.

Mr. BARTLETT. Thank you very much.

As we have downsized the military, because of economies and maintaining force structure in the Reserve and Guard, somewhat more of our capabilities have moved to the Reserve and Guard. Are we planning commensurate modernization of these platforms in the Reserve and Guard as compared to full-time forces?

General RALSTON. Yes, sir; let me answer that. I believe that we are. Today, we have the latest model F–16 is in the Air National Guard and the Air Force Reserve. The same is true on the part of the Navy. In the future, in the F–22, for example, we have plans for the F–22 to go into the Air National Guard. Out of the 20-wing force structure, again, on the Air Force, a third of it is in the Air National Guard and Air Force Reserve in the 20 wings. There is only 13 active. A similar case in our other services. So, I think all the services are paying attention to having front-line equipment, because we expect today, we have today Air National Guard and Air Force Reserve units are deployed to Bosnia; they are deployed to Turkey for Operation Provide Comfort; they are deployed to Southwest Asia for Operation Southern Watch. We depend on them; we have to have them. And if we do that, we have got to give them front-line equipment.

Mr. BARTLETT. In terms of personnel, it costs somewhere between one-third and one-fourth as much to maintain a person in the Reserve and Guard as it does in the full-time force. But in terms of the overall structure, an airplane costs the same amount whether it is part of the Reserve or Guard. What are the economies when you look at the overall force? I know it is going to be very different for Air Force, because you are dealing with very expensive equipment. It is going to be very different than in the Army. But what are the relative savings in maintaining this capability in the Reserve and Guard as compared to the full-time force overall?

General RALSTON. Well, again, it will depend on service and equipment. But let me give you an example again with what I am familiar with, in the case of Air. To buy the equipment, it is the

same price. But in the case of our Air National Guard or Air Force Reserve units, we fly them roughly about half of what you would fly an active-duty person during the year. And if you are buying it by cost per flying hour, then it would run roughly half. Now, that is the good news.

The downside of that is you cannot expect the reservist or the Air National Guard person to be gone 120 days, 180 days at a time year-in and year-out the way that his or her active duty counterparts are.

Mr. BARTLETT. OK; are we planning any different ratio of force structure between the full-time forces, the active forces and the Guard and Reserve in the future?

General RALSTON. We are looking at in some of the services a different mix. I am not sure how I would characterize that in terms of ratio. But, for example, in the Army, the Army Reserve will be picking up a higher percentage of combat service support as opposed to combat units. So, there is some change anticipated as we work with our reserve components in that regard.

Mr. BARTLETT. Do the Reserve and Guard folk feel that they are being treated appropriately in terms of modernization as they compete with the regular forces?

General RALSTON. Well again, I am sure it depends on which unit you are talking to. If you happen to be talking to a South Carolina unit that has Block 50 F–16's, they will tell you they are pretty happy with that. If you are talking with a unit in Idaho that has F–4's, they are probably not as happy with that. So, it is somewhere in between. But we do work very hard to pay attention to the modernization of the Reserve components, and I believe by and large, they will tell you that they are treated fairly.

Mr. BARTLETT. Do you think that they have an adequate voice at the table?

General RALSTON. Again, in my view, I feel very strongly that they have an adequate voice at the table.

Mr. BARTLETT. OK; I thank you very much, Mr. Chairman.

Mr. WELDON. Thank you, Mr. Bartlett.

The gentleman from South Carolina, the distinguished ranking member, is recognized for 5 minutes.

Mr. SPRATT. Thank you, Mr. Chairman, and I thank you all for your testimony. I think that this is something that needs a lot of focus and attention, and I just have some random questions.

First of all, just taking up the GAO theme that the E and F will provide marginal operational improvement at a high cost, looking at your chart, it deals with the comparison of the F/A–18 with the E and C models. The interdiction range is increased from 369 miles to 524 miles, and the ordnance payload is increased from 5,600 pounds to 9,000 pounds. Is the range increase from 369 to 524 achieved with the full ordnance loading of 9,000 pounds?

General RALSTON. The 9,000 pounds there, Mr. Spratt, is not the payload that the airplane carries, although it obviously can carry that much. That is how much it can come back and land on the carrier with.

Mr. SPRATT. Recovery.

General RALSTON. Recovery weight. That is fuel and ordnance that would be on board.

Mr. SPRATT. But fully loaded with its ordnance, can it then make 524 miles?

General RALSTON. I would have to get you an insert for the record on that. I will tell you in its typical combat load, it can go the 524 miles.

Mr. SPRATT. OK.

General RALSTON. Let me ask, is there somebody here who can—the 524 miles is with its typical combat load, not with its maximum combat load.

Mr. SPRATT. And how does a typical combat load on the E/F compare to a typical load on the C model?

General RALSTON. The typical combat load on the E model is about 25 percent greater than the typical combat load on the C model. So, with that 25 percent increase, it still goes the 40 percent further.

Mr. SPRATT. Do you think the 155 miles is a significant increment in the operational effectiveness of it? Does this give it deep strike capability, or does it mainly confine it to targets on the littoral?

General RALSTON. 524 miles is a significant range. Again, it depends on the scenario that you put it in. That is one of the things that was used to determine the requirement for the F–18E/F is what percentage of targets could you get at the greater range versus the 369, and that was one of the tradeoff items that was used to design the F–18E.

Mr. SPRATT. So, you get a significant number of targets by having that additional range added to it.

General RALSTON. Yes, sir.

Mr. SPRATT. With respect to your layered chart, I think it would be very useful to us if you could do it in then-year dollars. The constant dollars are helpful, I know, to you for planning purposes and analytical purposes. But for us, for just looking at what the budget can accommodate, it would be useful to have that in then-year dollars.

Mr. KAMINSKI. Be happy to do that, Mr. Spratt.

Mr. SPRATT. With the inflation adjustment backed out of it.

And looking at the chart again with respect to the E/F, I did not see a similar chart with respect to the F–22. It may be too early to develop a production learning curve for it, but it looks to me like a pretty steep learning curve. If I am reading that chart correctly, after you will get a 50-percent reduction in unit cost upon the construction of the 100th airplane.

Mr. KAMINSKI. It may even be a little more than that, Mr. Spratt. On the E/F?

Mr. SPRATT. Yes, sir.

Mr. KAMINSKI. Yes, if I make a comparison, the first lot on the E/F that would be bought, just to keep this common in 1997 dollars, that is the unit recurring flyaway costs of $133 million, and the last lot was $38 million. That is a little over 4 to 1. I guess your numbers are about right, between four and five to one.

Mr. SPRATT. Does that concern you? Does the steepness of that learning curve concern you?

Mr. KAMINSKI. It is not atypical. If you go to the curve in which I have plotted the two, the red and the green, you can see that the

E/F curve is a little steeper than the curve we experienced with the C/D but not a whole lot.

Mr. SPRATT. And do you have a similar learning curve expectation for the F–22 and the unit costs, the flyaway costs you are using for it?

Mr. KAMINSKI. Yes, and we would expect to have a similar learning curve, of course, for the Joint Strike Fighter as it comes along as well.

Mr. SPRATT. Now, wouldn't it be—I would just guess that your learning curve for the F–22 and the learning curve for the Joint Strike Fighter would be less steep, because with the E/F, you are building to some extent a modification of an existing airplane with more conventional technology. I do not know how much composite you are using in the skin of the F–22, but do not factors like this tend to flatten out the learning curve a bit?

Mr. KAMINSKI. I think we are using more composites in the E/F. That is one of the reasons you would expect there to be a steeper learning curve than on the C/D.

Mr. SPRATT. Can I get the analysts from GAO to give us their opinion of the learning curve assumptions behind these three airplanes?

Mr. RODRIGUES. Actually, I would like to say a couple of things regarding the E/F analysis. First of all, I think it is very dangerous to try in the abstract to compare things. When we are talking about ranges, you need to understand the profiles that they are flying. It makes a substantial difference in the ability of both of those aircraft in terms of how far they can deliver. This is very critical. The stated specific range for interdiction established for the E/F is 393 nautical miles. But we learned in Desert Storm, as you probably all know watching CNN, we overflew the threat. That is called a high-high-high profile or high-medium-high, but we stay high. That significantly affects how far you can fly with these planes.

So, when you are talking about these things, you need to look at that. If you use high-high-high in comparing against that 393 nautical mile spec requirement for interdiction, the C/D, using the current tanks that it can carry, can do 566 nautical miles. Now, I would grant you the E/F can go further, but I would also tie back to statements recently made by the Secretary of the Navy that 85 percent of the targets are within 200 nautical miles of the shore. If you do a standoff of 150 to 200 nautical miles with your carrier, and you fly high-high-high, you can get there with that C/D; you can get further than there, and you still have the option of tanking deeper.

So, I think you have to be very careful. I know this makes it very complicated, but you need to get behind the details and have apples-to-apples comparisons. I would say the same thing about costs. I would agree with the cost curves that Dr. Kaminski referred to up there. But you need to look carefully at those cost curves. They are not based on the same production rates. You are taking the last of the C/D's produced and not produced at the rates we are projecting for the E/F. I believe that was 36 or less a year. The E/F projections are based on, one, we are going to buy 1,000 of those aircraft, and we are going to buy them at a rate of 72 a year. Now, this Con-

gress has already told them that you did not believe that was affordable, and you sent them back to the drawing boards to reprice that. They have not come back with those prices.

Our assessment—and once again, you have got to do the apples-to-apples—if we do not buy the 1,000 aircraft, and what we did is we looked at the basis for the 1,000, which includes the Marine Corps. You back that out, and when you get down to 660, which is what you have left, and you say you are doing an apples-to-apples comparison at 36 a year, there are substantial differences in the flyaway costs between these aircraft: $28 million compared to $53 million, I believe.

Mr. WELDON. Will the gentleman yield?

Mr. SPRATT. Certainly.

Mr. WELDON. You are talking about when you back out the original Marine Corps requirement.

Mr. RODRIGUES. Yes, sir.

Mr. WELDON. Which has been backed out, and you are giving us those figures now in terms of what the difference will be, correct?

Mr. RODRIGUES. Mr. Chairman, and at comparable production rates to what you saw, what has been shown for the C production unit costs, which is known. I mean, we can tell you what a C costs to build. The E/F, you have got to go down those learning curves; you have got to make some assumptions about how many are we really going to produce, and what rate we are going to be able to produce at. And this all gets to the affordability issues, I think, that you spoke to, Mr. Chairman. There are some real affordability issues out there. And historically, our answer to those problems has been reduce the rates. Reduce the rate of production, which affects your economies of scale and affects price.

You just need to be very careful in looking at all of this data and make sure that we are giving it to you in an apples-to-apples comparison and that you understand that.

Mr. SPRATT. Thank you very much.

Mr. WELDON. Thank you, Mr. Spratt. We will start a second round.

I am sorry; Dr. Kaminski, yes?

Mr. KAMINSKI. Mr. Spratt, I think you asked me also for this learning curve on the F–22. I do not have it, but I will provide it for the record.

Mr. WELDON. Thank you.

We are going to start a second round, so if members have additional questions—Dr. Kaminski, in April, the committee staff received proprietary briefings from each of the three teams competing in the JAST program, and as a followup, they asked for the teams to provide judgment on technical costs and schedule risk of each of the concepts, and they assured the teams that the information would be treated as proprietary. Each of the contractors declined to respond, citing the direction from the program office. Will that change, and can we, in fact, get access, in fact guaranteeing the proprietary nature of the data?

Mr. KAMINSKI. It will change, Mr. Chairman, as soon as we have made our source selection. We have a source selection in process with each of those three teams responding to our request for proposals. That source selection will be completed and the awards

made by November, and then, it will be an open arrangement with the contractors. We will answer any question and provide any information we have to respond to your queries.

Mr. WELDON. Thank you. This next question is one that I want to ask while the chairman is here, because the chairman has taken great heat for his leadership in this Congress, this Congress' success in plussing up funding for the military over the past 2 years, and what has bothered many of us is that he in particular as our leader and many of us who have supported him on both sides of the aisle have been criticized one year, and then, the following year, the administration acknowledges that those plus-ups were in fact valid and in fact were worthwhile. And we are running into that cycle now as we approach the conference process.

So, General Ralston, let me start by asking the question of you, and then, I am going to ask Dr. Kaminski to respond for the Department. During testimony for the fiscal year 1996 Defense budget, the Secretary, the Chief of Staff and the then-commander of Air Combat Command, your predecessor in that job, clearly stated that at least 18 F–15E's and 120 F–18C/D's attrition aircraft represented the Air Force's second and third highest priority unfunded requirement and that they intended to budget for these required aircraft in future requests.

To address this requirement, Congress added fiscal year 1996 funding to procure six F–15E's and six F–16C/D's. The fiscal year 1997 President's request apparently supported this requirement by requesting procurement of four more of each aircraft. After both Houses sent in defense authorization reports, followed recommendations made by Secretary Perry in his fiscal year 1997 testimony and recommended additional funding to accelerate achieving these stated Air Force attrition aircraft requirements that Congress was informed that neither of these requirements were funded in the Future Years Defense Plan.

General Ralston, do you or do you not acknowledge these attrition reserve aircraft requirements, and do you or do you not support their funding?

General RALSTON. Yes, sir; as I mentioned before, if you take the expected attrition and extrapolate that out to 2010 or 2016 for the end state, our current force structure is not adequate to maintain the force structure with the expected attrition. Now, you have some options. You can either buy additional attrition aircraft, or you can reduce the force structure, or you can go and try to realign, take some out of the boneyard, for example. And in this particular case, yes, there is a requirement for additional ones. As I say, you do not have to buy them necessarily in 1997, but before the line ends is when you would need to make that decision.

Mr. WELDON. Thank you.

Dr. Kaminski, why is the Department chastising the committee for having funded additional F–15E's and F–16C/D's?

Mr. KAMINSKI. Mr. Chairman, I do not know that we are chastising the Department for doing that. Secretary Perry's general comment on adds has been that those things we were planning to buy in the Department that were in our Future Years Defense Plan that would be accelerated by adds, we would not oppose. Those

things that were not in our program that had tails to them, we would not go on record as supporting.

Mr. WELDON. I was just informed that the Comptroller has issued a report criticizing the Congress for adding in those dollars, and there has been a constant pattern both last year and this year of the administration criticizing us for the plus-ups we have made when, in fact, what has occurred this year is most if not all of the plus-ups we made last year have been acknowledged to be of vital importance to the military in this fiscal year. In fact, when Secretary Perry came before our full committee, the chart that he showed us had a flat line, and he acknowledged that, in fact, the administration had bottomed out the cuts in defense spending. So, in effect, he was taking credit for the money that we put in last year which he criticized us for doing.

That gets very frustrating when you sit up here, and it is because of this chairman's leadership that those decisions were made last year, and those decisions are being made this year. And I can tell you that it is really troubling to me when we try to work together, and we are doing what we think is right. And I think the President wins either way, because we put the money in for what we know the military service chiefs are telling us are the priorities, and then, the President criticizes us, and the Secretary criticizes us for doing that and then goes out and cuts the ribbons when those plants, in fact, get those dollars to employ the people to do that work. I can tell you that is extremely frustrating to me. And I just want to applaud the Chairman for his leadership in that area. It would not happen without you, Floyd.

Next question: Dr. Kaminski, regarding the foreign participation in JSF, you mentioned that, and the United Kingdom is a key. I have met with Mr. Arbuthnott when I was in London, and he expressed to me the importance of this program. I understand that commitment. But I understand that the total amount so far is less than 1 percent of the total R&D cost, and I understand that you are working diligently to get that raised up and get additional people interested. Can you tell me up front what you are doing up front to provide cost sharing with potential program participants to ensure that development costs to the degree possible are shared equitably?

Mr. KAMINSKI. Yes; what we have done, Mr. Chairman, is provided arrangements, what I would describe as entry ramps and exit ramps for people who want to cooperate with us on the program. It is possible to do that during the development phase; it is also possible to do that during the production phase in a coproduction sense. And the degree of participation varies by the type. An ally can participate only as an informed customer, in which case they will not make any contribution to the development program, but they will have an opportunity to have a front-row seat to understand what is being developed. Or, they can participate as a full partner.

The United Kingdom thusfar has committed to participate in the concept development phase. This is not the expected end of their investment in the program. So, when you talk about a 1 percent, I would think of it more of looking at the $3 billion associated with the concept development and use their $200 million with respect to

that ratio. So there, it is something like about 7 percent or so. Their out-year contribution has not been defined. They have entry ramps and exit ramps. We have just now begun some exploratory discussions with Norway and the Netherlands as well. I expect they will have some interest in participating in the program at a time yet to be determined.

Mr. WELDON. So, as of right now, it looks like we are talking three countries, and do you expect that to grow beyond the three that you mentioned?

Mr. KAMINSKI. I expect that it may well, although my own assessment of it is that the likely growth there will not be until the production phase.

Mr. WELDON. Dr. Williams, let us get you back into the discussion here. You have been sitting there very quietly observing everything. First of all, if you have any comments on anything that is being said, we welcome them. But particularly, can you provide further detail on why you think CBO believes there are affordability problems with the tac air program planned yet the Department believes is affordable?

Ms. WILLIAMS. Yes; thank you, Mr. Chairman. In fact, if we can bring back up the DOD's chart on that subject, I think that would be helpful, the one that shows rather than the tac air the total aircraft funding. I think there are three main differences between the way DOD is looking at this problem and the way that we are looking at it. The first is a question of taking different years, and what we did in our estimates of affordability was to take as wide a number of years as we could, both on the front end and on the out-year end, because if you are going to look at average shares, you want that average to be as inclusive as you can over the years.

If you look at the place that DOD happened to choose to start was the 1980's, and as you know, in the early 1980's, we had a strategic modernization program that included two bombers. And, you can see the bombers riding right on top there. So, the first thing is the years, but the second thing is what you put into your comparison, and we very particularly chose to compare only tac air procurement to tac air procurement and looking at it in the context of the entire defense budget.

If you decide that you want to widen to all aircraft, then you can answer the question why do you not widen to all conventional forces instead? Why widen to all aircraft? And you end up asking yourself is this the tradeoff I really want to make? If I do not have to buy those bombers any more, if I do not have to buy those strategic lift airplanes any more, do I want to put all the fallout money from not buying those directly into the tactical air procurement? That is the question you are asking. And the questions I pose have to do with the fact that there are many other claimants for these resources that you may want to provide money to: the ships, the helicopters, and so on.

Then, the third thing that is different is this inclusion of the development funding. So, looking at investment R&D plus procurement rather than just looking at procurement versus procurement. And the problem, as I mentioned in my oral statement, with doing that is that you do not know yet what development programs you are going to need on the far right. So, as I understand it, there is

no development in this chart on the far right for a new bomber or for a new lift airplane or for a new Navy fixed-wing asset other than the tac air fighters.

If you had to add those in, you are lying on the right, and your share on the right would be considerably higher. I do not know how much higher, which is why we did not add those in.

So, those are the differences as I understand them between the two ways of looking at things.

Mr. WELDON. Thank you.

Did you want to add anything to that either, Dr. Kaminski?

Mr. KAMINSKI. I would comment that that is a sustaining chart, that is, that is designed to be continuous with expectations for funding the other things for improvement and the like. And we can certainly illustrate other years. That was kind of an arbitrary choice of years. But we were doing this from the standpoint, though, of an argument which says you could not afford to put this amount of money in tactical air, and you can look at various categories. We started with the tactical air category. We then broadened it to the aircraft. Obviously, you can keep broadening it. And we do not believe affordability arguments say that you simply cannot do this.

Mr. WELDON. Did you want to add anything, General?

General RALSTON. No, sir.

Mr. WELDON. One final question. We have a vote on, unfortunately, and I have a number of questions I am going to submit for the record, and I believe Mr. Spratt does as well and other members. Dr. Kaminski, a number of concerns have been raised about the concurrency issue for the tac air programs, concurrency being defined as the number of aircraft that funds have been obligated for before the completion of all flight testing. Can you tell us the number of the aircraft for the F–22, the F/A–18E/F and the JSF that we be considered concurrent?

Mr. KAMINSKI. For the JSF program, Mr. Chairman, we have not worked out all the details yet. The schedule that I showed was based on no concurrency. And we will make sensible trades on that, trading when it is needed, but there is no concurrency in that program. On the F–22 program, we have a very slow rate of buildup in the program while we are still conducting flight testing. We do not ramp up before that testing is completed. I think this may involve commitment to about six aircraft. Somebody help me with that. I will get that for you for the record. It is a small number of aircraft at a slow ramp.

Mr. WELDON. Yes.

Mr. KAMINSKI. Let us see: let me correct one statement. I do not mean to say before testing is completed but before testing of a full configuration with full avionics has begun; that is the point at which we constrain the rampup on the F–22 program. And I will get you the number of aircraft between those two points for the record. I will also have to supply that number for the F–18E/F for the record. I do not have it with me today.

Mr. WELDON. I would like to ask the GAO to respond also to that question.

Mr. RODRIGUES. Yes, sir; on the F–22 program, first, let me deal with the measure of concurrency. The measure of concurrency was

established based on direction from the Congress to analyze the whole issue of concurrency in programs. In 1990, DOD did do a study, and part of that was to define the appropriate measure, which at that time in that study was defined by the Office of the Secretary of Defense as a highly concurrent program is one that proceeds before significant Initial Operational Testing [IOT] is complete.

Now, if you were to look at this and try to measure it different ways, I can tell you that by the time that we complete as planned—if we complete it as planned—the initial operational testing and evaluation on the F–22 aircraft, we will have 76 aircraft on contract at a cost of about $12 billion. That is before you know that this does everything that you want it to do in an operational environment, that you have proven it out thoroughly.

If you were to take snapshots of that and look at it, they are not scheduled on some of the more challenging aspects of the aircraft, integrated avionics, for example; first flight of an equipped F–22 with complete integrated avionics is not scheduled to begin until September 1999. And some of these dates may have slipped, but at the point in time when we were looking at the schedule, 2 years after the start of production. And by that time, the Air Force would have already made commitments to procure 20 aircraft and will have issued for long-lead materials for an additional 24. And obviously, the integrated avionics on this is a very important part, as Dr. Kaminski referred to earlier, so a high degree of concurrency.

When we compared this to prior programs, this program was more concurrent than all except the F–15, which it was about the same, about 18 percent total prior to completion of the testing, and certainly, times have changed. Those programs were built in a year when we were facing threats. We had the Russians, and there was some urgency to try to get out some things. That no longer exists.

I would like to focus a little bit on the argument on the F–22, the discussion on the F–22. The issue is not whether you need the F–22; it is when you need the F–22. And to argue that by slowing down production early on until you are able to prove it out, prove it out completely, will increase the cost of the aircraft, I look at it, and I say well, but if you do not need the aircraft, replacing perfectly good aircraft now that can more than meet the threat into the foreseeable future with a newer aircraft that is better, that is nice if you can afford it, but if you cannot afford it, that new aircraft is going to get used up, and you are going to have to replace it, and it is much more expensive.

So, I mean, there are a lot aspects of this to look at, but I think the concurrency issue on the F–22 is a real issue, and I think you need to keep focusing on it, and I think these committees have focused on it, and it is: it is a lot of money to have sunk into an aircraft before we have proven it out.

Mr. KAMINSKI. Mr. Chairman, if I might respond, I agree it is a key issue. It is an issue we are watching very carefully. We asked our Defense Science Board to go off and do an independent review, come back and give us their approval of the concurrency on the program. Their assessment: they looked at several different ways to measure concurrency and tried to reach their judgment on the approach of the program. They concluded certainly there is a de-

gree of concurrency on the program, but the degree of concurrency is appropriate.

Mr. GEREN. Mr. Chairman.

Mr. WELDON. Yes.

Mr. GEREN. Before we break, and just on that point that Mr. Rodrigues and Dr. Kaminski have addressed, if we did push the F–22 to the right, and I am not asking for the answer now, but I would like it in writing; I know we are heading for the vote. Could you discuss, Dr. Kaminski, General Ralston, and the GAO as well, the impact on other tactical air programs if the F–22 were pushed to the right? Because there would be a ripple effect, I would expect, in other areas. It cannot be looked at in a vacuum, and I think it is important to us listening to this recommendation or at least issue raised by Mr. Rodrigues that we consider what the total implications would be of something like that.

Mr. RODRIGUES. Could I try to talk to that a little bit at this point? In our analysis, what we did is we looked at the premier air superiority fighter we have in the inventory today, the F–15. We held it stagnant, no further improvements to it. We looked at the most advanced threat, compared it to the most advanced threat. It came out better. We were assuming certain improvements to certain parts. I cannot talk about the details because of the classifications. But we gave them improvements; we held those constant. You cannot do anything with the F–15. Bounced them up against the F–15; still there.

Now, when we also looked at the structural life on the F–15, what we found was based on the Air Force studies that had just been completed that the F–15's in the force at that time, about 900 that the service life was good out through the year 2015 before they would start to drop out of the force. So, your impact? Well, you want to get rid of the F–15's, and I do not know any other way to put that. I am not suggesting you have to go out and buy a different aircraft. What we talked about was when do you need to really start mass-producing that F–22 and bringing it on line?

Mr. GEREN. I understand your point.

Mr. KAMINSKI. And I would like to add if I could, sir, that part of the problem we have got here, we have phased these programs so that you are not having a peak F–22 funding year and a peak Joint Strike Fighter all at the same time. And if you slide the F–22 out to do that, you wind up adding those peaks on top of each other. It is a very difficult problem.

Mr. GEREN. The consequences of that certainly have to be examined fully, and it would be helpful for the committee for you to respond for the record.

Mr. WELDON. I thank the gentleman. I would just say—we have about 4 minutes left for the vote—I would just say to our distinguished panel that this is just the first in what will be an ongoing effort by this committee, both subcommittees and the full committee, to monitor the tactical aviation requirements and the time lines and programs, and we will be constantly in touch with both CBO and GAO and actively pursuing input from both of your agencies as we work with the Department of Defense to meet the requirements that all of us agree are there that we have to deal with.

I think in this kind of an enlightened way, we can end up making the best decisions for the taxpayers and perhaps most importantly the troops that are going to be asked to serve in the military and defend this country wherever around the world.

So, with that, I thank you all for your outstanding cooperation, and with that, we will adjourn the hearing.

[Whereupon, at 3:48 p.m., the subcommittees were adjourned.]

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